



**CHROMOPHARE®**  
**D 650<sub>plus</sub>, D 530<sub>plus</sub>, D 500<sub>plus</sub>**  
**D 650, D 530, D 500**

Service Manual (E)

Single Light and Combination Light

**Berchtold.**  
**Wir helfen**

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## 1. GENERAL

### 1.1 Introduction

The CHROMOPHARE® D 650plus, D 530plus and D 500plus consists of a swivel arm support, a lamp housing and a flange tube.

The lamp housing is fixed to a cardanic-type support (vertical gimbal joint, horizontal gimbal joint) and can be rotated, swivelled and tilted in any direction. The height is adjusted via the 360° rotating vertical spring arm. The spatial position of the lamp is adjusted by means of the 360° rotating horizontal swivel arm.

The special features of the CHROMOPHARE® D generation are:

- Dents and paint scratches or chips on the light hood are eliminated. An impact-absorbent light hood made of polymer material prevents deformations and paint defects.
- Cool light in the surgical area and in the beam path of the operating lights, which is achieved by filtering out the infrared proportion by means of the proven ThermoSorb® double filter system.
- The newly designed suspension and the hand grip with a particularly wide protective collar and an integrated release mechanism, ensure a high degree of hygiene.
- A new type of secondary surgical area illumination reduces lighting contrasts between the bright light field and the immediate environmental field and thereby improves the adaptation of the surgeon's eyes between primary and secondary surgical areas.

Additional special features of the CHROMOPHARE® D 650plus

- High i luminance of 130.000 lux for illuminating a deep surgical area, which is achieved with the assistance of the newly developed polygon reflector with its mirror-like surface and "light booster".
- Excellent depth of illumination and low shadow levels, which are achieved by modifying the light beam using 2x400 reflector elements.
- In the case of failure of the main lamp, 100 percent identical light ratios are guaranteed by the lamp-swivel mechanism, which swings the reserve lamp into the position of the main lamp.

Additional special features of the CHROMOPHARE® D 530plus

- High i luminance of 110.000 lux for illuminating a deep surgical area, which is achieved with the assistance of the newly developed polygon reflector with its mirror-like surface.
- Excellent depth of illumination and low shadow levels, which are achieved by modifying the light beam using 2x360 reflector elements.

Additional special features of the CHROMOPHARE® D 500plus

- I luminance of 90.000 lux for illuminating a deep surgical area, which is achieved with the assistance of the newly developed polygon reflector with its mirror-like surface.
- Excellent depth of illumination and low shadow levels, which are achieved by modifying the light beam using 2x360 reflector elements.

## 1.2 Manufacturer's notes

The manufacturer of the products specified in the service manual is

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**Ludwigstaler Straße 25**  
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**e-mail: [Info@BERCHTOLD.de](mailto:Info@BERCHTOLD.de)**  
**Tel. (+49) 7461 / 181-0**  
**Fax (+49) 7461 / 181-200**

## 1.3 General information

- This user's manual is considered part of the equipment. It must be kept in the vicinity of the equipment at all times. Precise observance of the user's manual is a prerequisite for the proper use and correct operation of the equipment, which is essential for the safety of patients and operators alike.
- Only accessories which are specified in this user's manual, and which have been tested together with the equipment, may be used. If accessories are used which are not specified in the user's manual, their ability to be used in accordance with safety regulations must be proved.
- All literature relates to the equipment model and the prevailing basic safety regulations when printed. All rights are reserved for equipment, switches, procedures, software programs and names.

## 1.4 Information about product liability

BERCHTOLD considers itself responsible for the consequences of safety, reliability and performance of the equipment only if:

- a) installation, modifications or repairs have been performed only by BERCHTOLD, or by an agent expressly authorized by BERCHTOLD to do so,
- b) the electrical installation of the room complies with regulations IEC 60364-7-10,
- c) the equipment is used in accordance with the user's manual.

## 1.5 Receiving inspection

Please inspect the equipment and accessories immediately after receipt for any transportation damage and defects.

Claims for damage will only be valid if the vendor (BERCHTOLD) or the carrier are informed at once. A damage report must then be prepared immediately. The damage record must be submitted to the nearest BERCHTOLD representative or to BERCHTOLD directly.

When an appliance or parts of an appliance are returned to BERCHTOLD or to a BERCHTOLD service agent, the original packaging should be used where possible. The following accompanying documentation must be attached: owner's name and address, equipment number (see type plate), description of the defect.

## 1.6 EC Certification

The equipment complies with the requirements of the EC guideline regarding medical products, 93/42/EEC as well as the UL guidelines.

## 1.7 Maintenance

The CHROMOPHARE® lights should be serviced once a year (maintenance contract). The Maintenance consist the steps as listed in the range of maintenance page 71.

# 2. COMMISSIONING

## 2.1 Range of application (purpose)

The CHROMOPHARE® light is a medical light for use in hospital treatment rooms. It is used for the local illumination of the patient's body, so that illnesses, injuries and handicaps can be recognized and treated. It may only be used in rooms which have been correctly designed out in accordance with IEC 60364-7-10.

The CHROMOPHARE® light as a single light provides a very high degree of failure protection, as it is equipped with automatic switch-over to a reserve lamp, electronic monitoring with a "bypass switch" and an automatic APU switch-over. However, not all components are duplicated, so that in some circumstances a failure is still possible. As a matter of principle, single lights should not be used for operations where a light failure could represent a great danger to the patient.

Light combinations with two or even three light heads provide more security against light failure and a better brightness of the operating field. They provide light from different angles and maximum protection against light failure due to the fact that all components exist twice. This applies particularly when they are connected to an emergency power supply (APU) in addition to the mains supply. These combination lights may be used in all medical disciplines for the illumination of surgical areas.

## 2.2 Safety information's

- Incorrect operation and non-observance of safety measures can cause serious incidents. Therefore make sure that you have read and understood the information in your CHROMOPHARE® operating instructions.
- The light is not intended for operation in areas where there is danger of explosion.
- Do not look into the switched-on light from the front and do not put any reflective objects into the path of the beam. Because of the high illumination strength there is a danger of glare.
- The distance between the light emission surface area of the operating light and the patient surface should not be less than 60 cm in order to ensure proper illumination.
- The light must not be operated if the cover glass or the filter system is damaged or destroyed. Thermal radiation can reach the surgical area, heating up and drying out the tissue of the operation wound. If the effect is prolonged, there is even the danger of tissue necrosis.
- Do not place any objects on the lamp housing or hang objects on arms or lamp housings, as this may compromise the stability of the fixing and there is the danger that these objects may fall into the surgical area. Attaching or hanging heavy objects can destroy the mechanism.
- The lamp housing must not be covered while in operation, as this prevents heat exchange with the environment and could cause the surgical light to overheat.

- Collision of the supporting arms and lamp housings should to be avoided. A severe collision could result in lights being damaged or parts knocked off and falling into the surgical area.

### 2.3 Installation

Mounting and installation of the CHROMOPHARE® lights must be in accordance with BERCHTOLD's "Mounting instructions for ceiling lights" and must only be performed by BERCHTOLD employees or by installation companies authorized by BERCHTOLD. The installation of lights on the ceiling of the operating room must be performed in accordance with BERCHTOLD's "Ceiling anchor plate and spacer block" mounting instructions due to weight and high torque.

Incorrect assembly of the lights can result in ceiling anchorage damage off and falling down, critically injuring the patient and operating staff in the process. The on-site electric installation must be performed in accordance with IEC 60364-7-10 and include a fuse protection as well as a mains switch for a simultaneous all-pole separation of the light. For further information, please note the mounting instructions.

### 2.4 Visual and performance check

Before initial start-up the manufacturer or supplier should check that the CHROMOPHARE® light has been properly installed and is in a safe and operational condition.

A visual inspection of the following points must take place:

- After switching-on the unit, light must be emitted from the main lamp, and in the case of combination lights, also from the additional lamp.
- Inspection of the light emission lens of the lamp housing.  
If the light emission lens is damaged or broken, glass splinters can fall out. The light must be switched off immediately and must not be used until the defect has been rectified.
- Inspection of the reserve lamp warning indicator.  
In the case of failure of the main lamp, the reserve lamp is automatically switched on and swung into the position of the main lamp. The red warning indicator on the lamp housing illuminates to indicate this error. The defective main lamp must be replaced immediately.
- Checking the operational state of the control unit.  
The individual functions must be checked by activating the appropriate keys. Faults in the main circuit of the control electronics of the CHROMOPHARE® D 650plus and D 530plus are indicated by the red fault indicator on the control unit. In this case the light operates at its maximum luminous intensity and can no longer be controlled via the keys.
- Checking the movement mechanism for perfect operation.  
The mechanical operation of the lights is checked by swivelling and rotating the movement mechanism.

## 2.5 Cleaning, sterilization, disinfection

- All parts of the CHROMOPHARE® light can be cleaned with standard commercial cleaners on all exterior surfaces including the control unit, and disinfected with the disinfectants normally used in surgical areas.
- Cleaning, disinfectant and sterilization of the sterilizable handles.  
The sterilizable handles are made of heat-proof, impact-resistant plastic. They can be cleaned with mild alkaline cleaners without active chlorine. The cleaners must be thoroughly rinsed off with water. Alternatively, the hand-grip holders can be cleaned mechanically with heat-sterilisation up to a maximum temperature of 93°C/10 min.

For disinfecting the handle sleeves we recommend products with an alcohol or aldehyde base. The sleeves must be rinsed before sterilization.

The handles can be sterilized in steam. The recommended parameters are:

1. Steam sterilization at 121° C; 1.3 bar; 25 to 30 minutes
2. Steam sterilization at 134° C; 2.3 bar; 4 minutes

When filling the autoclave ensure that the open side of the handles are face down. The sleeves must lie free and must not come into contact with any other items being sterilized.

Hot-air sterilization is not recommended by BERCHTOLD. However, if it is necessary, the handles should be sterilized loose at 134° C; 3 minutes.

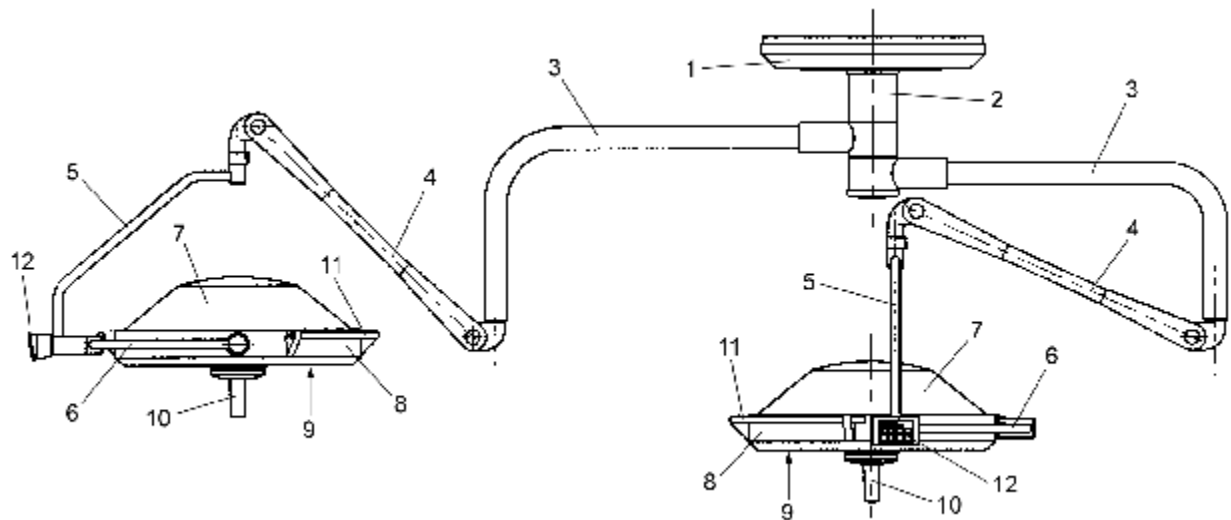
- Damaged grip sleeves must not continue to be used.

*Note: Sterilizable handles are subject to natural wear. As a rule, a life of approx. 100 cleaning cycles is normal.*

### 3. OPERATION

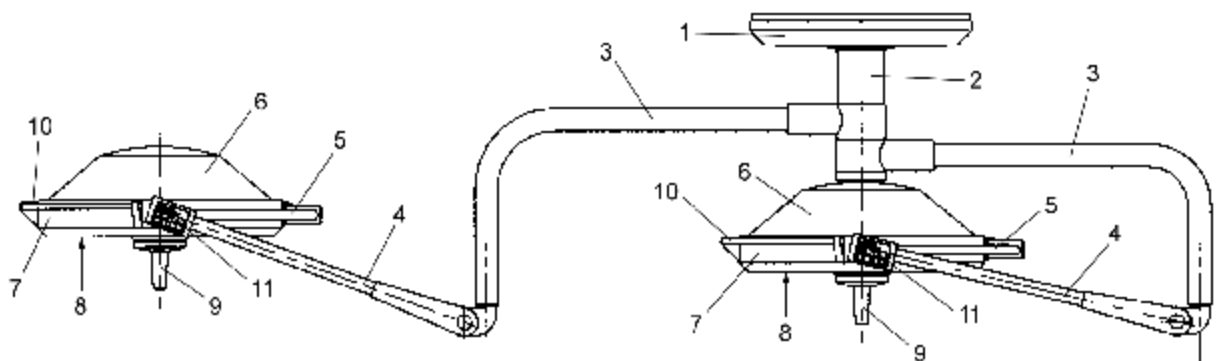
#### 3.1 Components

##### 3.1.1 CHROMOPHARE® D 650plus/650plus, D 650/650 (classic cardanic)



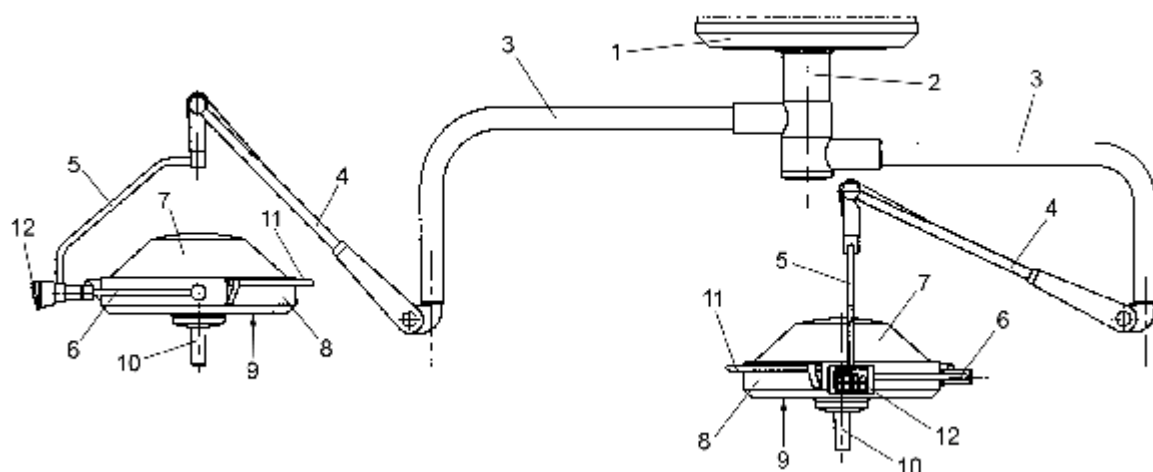
- |   |                         |    |                                |
|---|-------------------------|----|--------------------------------|
| 1 | Ceiling cover           | 7  | Lamp housing hood              |
| 2 | Flange tube dia. 125 mm | 8  | Lamp frame                     |
| 3 | Horizontal swivel arm   | 9  | Light emission lens            |
| 4 | Vertical spring arm     | 10 | Sterilizable hand grip sleeves |
| 5 | Vertical gimbal joint   | 11 | Rail (encircling hand grip)    |
| 6 | Horizontal gimbal joint | 12 | Control unit                   |

##### 3.1.2 CHROMOPHARE® D 650plus/650plus, D 650/650 (flat cardanic)



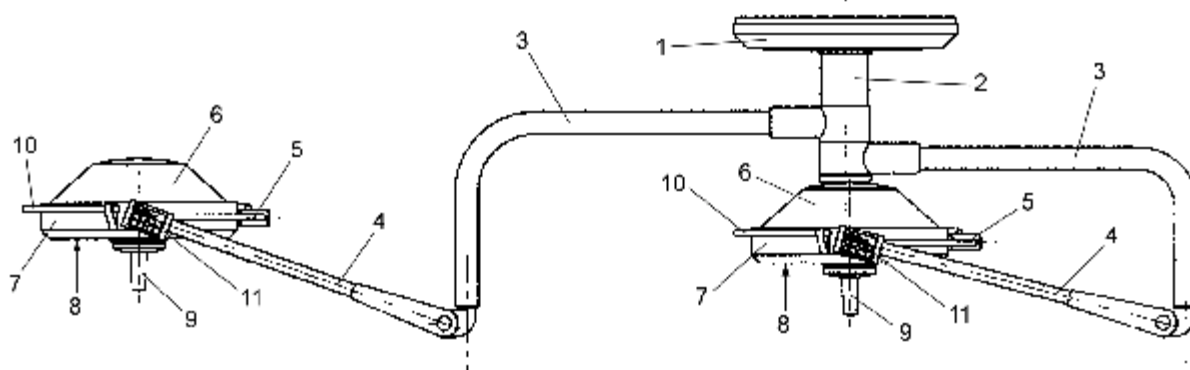
- |   |                         |    |                                |
|---|-------------------------|----|--------------------------------|
| 1 | Ceiling cover           | 7  | Lamp frame                     |
| 2 | Flange tube dia. 125 mm | 8  | Light emission lens            |
| 3 | Horizontal swivel arm   | 9  | Sterilizable hand grip sleeves |
| 4 | Vertical spring arm     | 10 | Rail (encircling hand grip)    |
| 5 | Horizontal gimbal joint | 11 | Control unit                   |
| 6 | Lamp housing hood       |    |                                |

### 3.1.3 CHROMOPHARE® D 530plus/530plus, D 530/530 (classic cardanic)



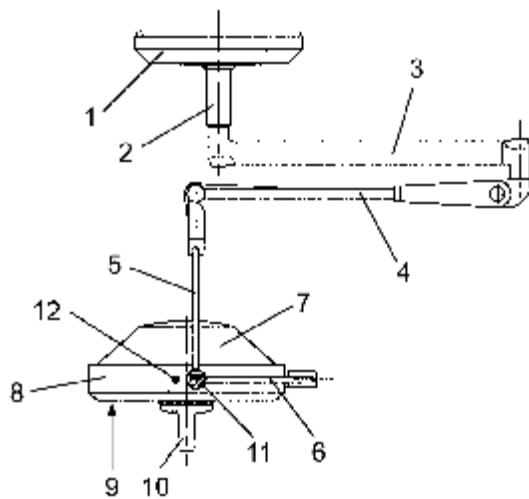
- |   |                         |    |                                |
|---|-------------------------|----|--------------------------------|
| 1 | Ceiling cover           | 7  | Lamp housing hood              |
| 2 | Flange tube dia. 125 mm | 8  | Lamp frame                     |
| 3 | Horizontal swivel arm   | 9  | Light emission lens            |
| 4 | Vertical spring arm     | 10 | Sterilizable hand grip sleeves |
| 5 | Vertical gimbal joint   | 11 | Rail (encircling hand grip)    |
| 6 | Horizontal gimbal joint | 12 | Control unit                   |

### 3.1.4 CHROMOPHARE® D 530plus/530plus, D 530/530 (flat cardanic)



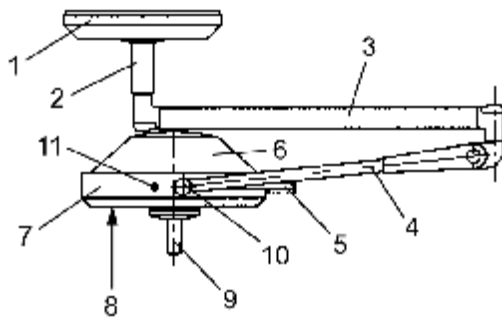
- |   |                         |    |                                |
|---|-------------------------|----|--------------------------------|
| 1 | Ceiling cover           | 7  | Lamp frame                     |
| 2 | Flange tube dia. 125 mm | 8  | Light emission lens            |
| 3 | Horizontal swivel arm   | 9  | Sterilizable hand grip sleeves |
| 4 | Vertical spring arm     | 10 | Rail (encircling hand grip)    |
| 5 | Horizontal gimbal joint | 11 | Control unit                   |
| 6 | Lamp housing hood       |    |                                |

### 3.1.5 CHROMOPHARE® D 500plus, D 500 (classic cardanic)



- 1 Ceiling cover
- 2 Flange tube dia. 65 mm
- 3 Horizontal swivel arm
- 4 Vertical spring arm
- 5 Vertical gimbal joint
- 6 Horizontal gimbal joint
- 7 Lamp housing hood
- 8 Lamp frame
- 9 Light emission lens
- 10 Sterilizable hand grip sleeves
- 11 On/Off switch
- 12 Yellow indicator light reserve bulb

### 3.1.4 CHROMOPHARE® D 500plus, D 500 (flat cardanic)



- 1 Ceiling cover
- 2 Flange tube dia. 65 mm
- 3 Horizontal swivel arm
- 4 Vertical spring arm
- 5 Horizontal gimbal joint
- 6 Lamp housing hood
- 7 Lamp frame
- 8 Light emission lens
- 9 Sterilizable hand grip sleeves
- 10 On/Off switch
- 11 Yellow indicator light reserve bulb

## 3.2 Notes on operation

### 3.2.1 Setting the control unit functions

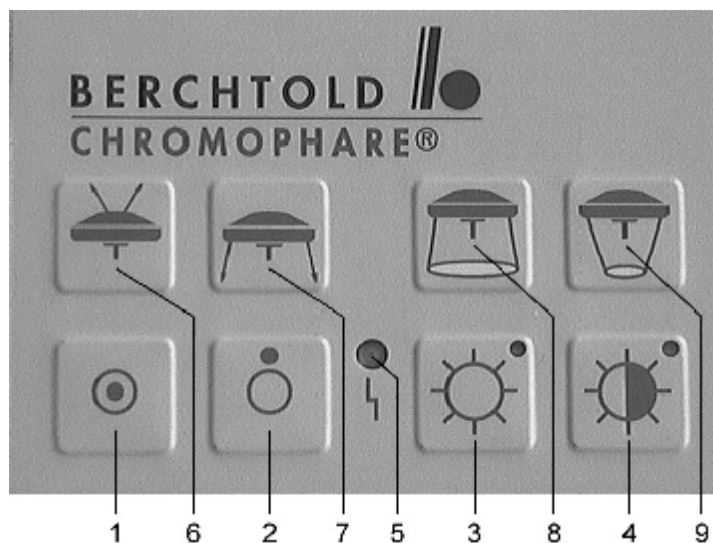
#### 3.2.1.1 CHROMOPHARE® D 650plus, D 650

The following functions can be controlled by the control unit:

- On/off
- Intensity of illumination

Options:

- Electronic light field adjustment - only for LFN
- Switch over to EndoLite® surround light - switch to operating light - only with EndoLite® option



- |                    |   |
|--------------------|---|
| 1 ON               | Switch on the light   |
| 2 OFF              | Switch off the light  |
| 3 Bright           | Increase intensity  |
| 4 Dark             | Decrease intensity  |
| 5 Fault            | LED indicates that the control unit has a fault                 |
| Options:           |   |
| 6 EndoLite®        | Switch from surgical area light to surround light (option only) |
| 7 OP light         | Switch from surround light to surgical area light               |
| 8 Field size large | Enlarge field size (only with LFN option)                       |
| 9 Field size small | Reduce field size (only with LFN option)                        |

- 1 The OP light is switched on by pressing Key 1 (ON)
- 2 The OP light is switched off by pressing Key 2 (OFF)
- 3 By pressing and holding down Key 3 (BRIGHT) the illuminance is continuously increased up to the maximum value. Repeated short presses increase the illuminance in steps.

- 4 By pressing and holding down Key 4 (DARK) the illuminance is continuously reduced down to the minimum value. Repeated short presses decrease the illuminance in steps.
- 5 If the indicator light shows red, there is a fault in the control unit electronics
- 6 Only with the EndoLite® option. By pressing Key 6 EndoLite® the surgical area illumination is switched off and the surround lighting is switched on
- 7 Only with the EndoLite® option. By pressing Key 7 (OP light) the EndoLite® surround lighting is switched off and the surgical area lighting is switched on again.
- 8 Only with the LFN model. By pressing and holding down Key 8 (field size large) the light field is continuously enlarged up to the maximum value. Repeated short presses enlarge the light field in steps.
- 9 Only with the LFN model. By pressing and holding down Key 9 (field size small) the light field is continuously reduced down to the minimum value. Repeated short presses reduce the light field in steps.

#### **Booster activation**

1. Press key 4 (Bright) until LED flashes up in the key (max. brightness).
2. The light booster will be activated by pressing simultaneously the key 1 (ON) and 3 (Bright). Luminous power rises from 110 kLux to 130 kLux.

#### **Note!**

The light booster is deactivated by switching off the light with key 2 (OFF).

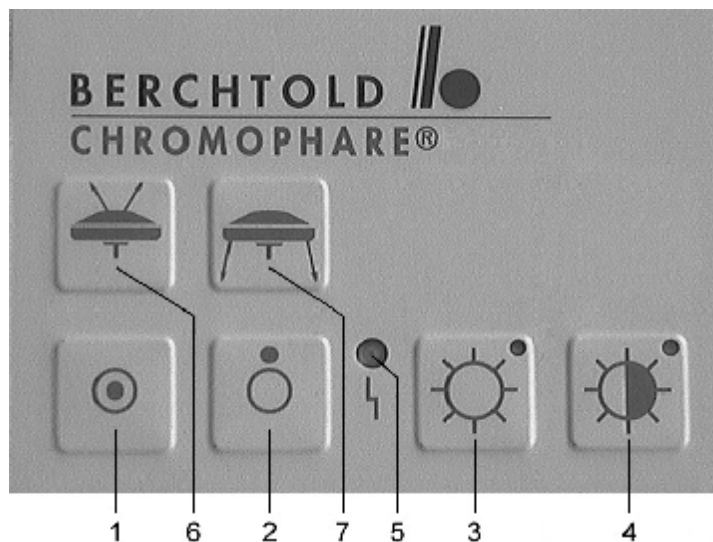
### 3.2.1.2 CHROMOPHARE® D 530plus, D 530

The following functions can be controlled by the control unit:

- On/off
- Intensity of illumination

Options:

- Switch over to EndoLite® surround light - switch to operating light - only with EndoLite® option



- |             |   |
|-------------|---|
| 1 ON        | Switch on the light   |
| 2 OFF       | Switch off the light  |
| 3 Bright    | Increase intensity  |
| 4 Dark      | Decrease intensity  |
| 5 Fault     | LED indicates that the control unit has a fault                 |
| Options:    |   |
| 6 EndoLite® | Switch from surgical area light to surround light (option only) |
| 7 OP light  | Switch from surround light to surgical area light               |

- 1 The OP light is switched on by pressing Key 1 (ON)
- 2 The OP light is switched off by pressing Key 2 (OFF)
- 3 By pressing and holding down Key 3 (BRIGHT) the illuminance is continuously increased up to the maximum value. Repeated short presses increase the illuminance in steps.
- 4 By pressing and holding down Key 4 (DARK) the illuminance is continuously reduced down to the minimum value. Repeated short presses decrease the illuminance in steps.
- 5 If the indicator light shows red, there is a fault in the control unit electronics
- 6 Only with the EndoLite® option. By pressing Key 6 EndoLite® the surgical area illumination is switched off and the surround lighting is switched on

- 7 Only with the EndoLite® option. By pressing Key 7 (OP light) the EndoLite® surround lighting is switched off and the surgical area lighting is switched on again.

### 3.2.1.3 CHROMOPHARE® D 500plus, D 500

The following functions can be controlled by the control unit:

- On/Off



1 ON  
1 OFF

Switch on the light  
Switch off the light

- 1 The OP light is switched on by pressing Key 1 (ON)
- 2 The OP light is switched off by pressing Key 2 (OFF)

### 3.2.2 Adjusting the field size with the centre hand grip

By turning the sterilizable centre hand grip the size of the light field is changed. By turning the hand grip in the clockwise direction the light field is enlarged, by turning anti-clockwise the light field is reduced. The surgeon must perform the optimum field setting himself in accordance with the size of the operation opening. There is an optimum contrast when the field size is set approx. 2 - 3 cm larger than the operation opening, so that the edge of the sterile covering is also illuminated. Thus the adaptation of the surgeon's eyes in the whole field of vision is improved.

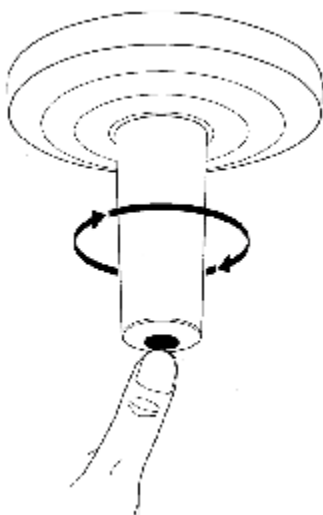
### 3.2.3 Adjusting the field size - light field plotting model LFN (option only D 650plus, D 650)

The CHROMOPHARE® D 650plus and D 650 with light field plotting allows the field size to be adjusted by an electric motor.

By pressing and holding down Key 8 (see control unit page 14) the light field is continuously enlarged up to the maximum value. By repeated short presses the light field is enlarged in steps.

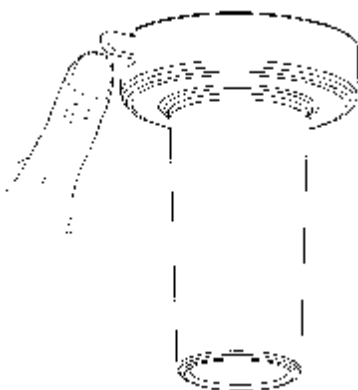
By pressing and holding down Key 9 (see control unit page 14) the light field is continuously reduced down to the minimum value. By repeated short presses the light field is reduced in steps.

### 3.2.4 Changing the sterilizable hand grip



By pressing the release button the hand grip sleeve is released and can be removed from the sleeve mounting. The new sterilized replacement sleeve is pushed onto the sleeve mounting until it touches the stop and is then turned in a clockwise direction until the sleeve locks into place.

### 3.2.5 Changing the sterilizable hand grip light field plotting model LFN (option only D 650plus, D 650)



The sterilizable hand grip sleeve is released by pressure on the bolt on the upper collar of the sleeve. It can then be removed from the sleeve mounting.

The new sterilized replacement sleeve is pushed onto the sleeve mounting until it touches the stop and is then turned in a clockwise direction until the sleeve is heard locking into place.

### 3.2.6 Light field plotting model LFN (option only D 650plus, D 650)

The CHROMOPHARE® D 650plus und D 650 can be ordered with an LFN light field plotter as an option. The light field plotter is an electronic control system, which moves the lamps by electric motor. An infrared beam which is reflected by a reflector disk controls the light field plotter.



The operator can direct the light field to the position which guarantees optimum illumination of the surgical area, by means of a reflector disk, the so-called „Light Pilot“.

The „Light Pilot“ should be held in the centre of the light field as far as possible and then slowly moved to the desired position. If movement is too quick, the light field will not be able to follow the „Light Pilot“.

This rule is: Wherever the light field is, the „Light Pilot“ will be hit by the infrared beam and can reflect the beam back.

## 3.3 Accessories for CHROMOPHARE® generation D

### 3.3.1 Sterilizable hand grip sleeves

- Standard replacement sleeves Order no. CZ 499-06
- Replacement sleeves for LFN (only D 650plus, D 650) Order no. CZ 498-04
- Replacement sleeves for light system with ChromoVision® AFII Order no. CZ 498-06

#### *Note!*

*Each CHROMOPHARE® D 650plus light system has sterilizable handles.*

*For directions about cleaning disinfection and sterilization, see page 10.*

### 3.3.2 Halogen bulbs (reserve halogen bulbs)

#### 3.3.2.1 CHROMOPHARE® D 650plus, D 530plus, D 500plus

- Halogen bulb 22,8 V/ 150 W Order no. CZ 908-22

#### 3.3.2.2 CHROMOPHARE® D 650

- for light with color temperature 4500K 22,8 V/ 250 W Order no. CZ 907-22
- for light with color temperature 3600K 22,8 V/ 150 W Order no. CZ 908-22

#### 3.3.2.3 CHROMOPHARE® D 530, D 500

- for light with color temperature 4500K 22,8 V/ 150 W Order no. CZ 908-22
- for light with color temperature 3600K 22,8 V/ 110 W Order no. CZ 905-22

### 3.4 Systemvarianten

The CHROMOPHARE® generation D is available in the following system variants:

1. CHROMOPHARE® D 650plus as a single light
2. CHROMOPHARE® D 650plus as a double and a triple light
3. CHROMOPHARE® D 650plus as a combination light with D 530plus
4. CHROMOPHARE® D 650plus as a combination light with D 500plus
5. CHROMOPHARE® D 530plus as a single light
6. CHROMOPHARE® D 530plus as a double and a triple light
7. CHROMOPHARE® D 500plus as a single light
8. CHROMOPHARE® D 500plus as a double light

### 3.5 Options

The CHROMOPHARE® generation D can be supplemented or upgraded with the following options:

- Light carrier arm for up to 15 kg load with AC and PA connections for an auxiliary device for example. (Only possible if the light has been prepared for an additional arm in advance)
- Supply carrier arm for up to 25 kg load with AC and PA connections, prepared for gas supply. This option must be ordered with the lighting system (not upgradeable).
- Wall control unit for installation into a wall indicator panel. Functions such as switching on/off and brightness of the OP light can then be controlled from the wall. (not upgradeable).
- EndoLite® - an environment illumination for MIS-surgeries, a 20 Watts halogen bulb integrated in the light head, activated when the main light is switched off.

### 3.6 Instructions for changing lamps

The halogen bulb has an average life of 1000 hours. In the event of failure of the main lamp, switch over to a reserve lamp occurs automatically and the reserve lamp swivels automatically into the former position of the main lamp.

A red indicator lights up on the lamp housing when the lamp safety system has switched over to the reserve lamp.

The defective main lamp should then be exchanged as quickly as possible.

The bulbs must be replaced in the following manner:



The symbol with the meaning 'Danger - Risk of Burning' is placed on the lamp support.



Switch off the lighting system and let it cool down (risk of burning). During replacement of the lamps the patient must not be touched as it is possible to come into contact with parts under tension.

Release and remove sterilizable handle.

Unscrew the knurled screw on the underside of the light by turning anti-clockwise.



Pull out the whole light system at the hand grip.

Remove a faulty halogen lamp. We advise users to insert the reserve lamp into the main light lamp holder, marked with <R>, and to insert the new halogen lamp in the reserve lamp holder so that the reserve lamp does not become too worn.



Fit a new halogen bulb into the bulb holder, - for the booking reference number see paragraph 3.3.2 halogen bulb on page 19 - (do not touch the quartz cone of the halogen bulb with your bare fingers, use a cloth or soft paper). During a lamp change check the bulb holder for scorch marks. If scorch marks are present, inform our service department.



Fit the light system back into the holder (picture 4) and screw up the knurled screws in a clockwise direction.

Switch the lighting system on and check that the lamp is on and the red indicator light is off.


**Note!**

**Only use original BERCHTOLD halogen bulbs. If other bulbs are used, all guarantees regarding performance and operation will lapse.**

## 4. TECHNICAL DATA


### 4.1 CHROMOPHARE® D 650plus

Light technical data	D 650plus	
Reflector system	Polygon reflector	
Colour temperature	4500 K	3600 K
Intensity Ec at 1 m [klx]	130	150
Intensity control [klx]	70 - 130	70 - 150
Total radiant power at max intensity	485 W/m²	555 W/m²
Total radiant power/intensity Ec [mW/m²lux]	3,7	
Colour rendering index Ra	94	
Light field diameter	15 – 28 cm	15 – 28 cm
d10 Light field dia. at 10% of max intensity	15 cm	15 cm
d50 Light field dia. at 50% of max intensity	8 cm	8 cm
Remaining illuminance when beam is obstructed by one mask	47 %	47 %
Remaining illuminance when beam is obstructed by two mask	45 %	45 %
Remaining illuminance inside at the bottom of a standardised tube.	100 %	100 %
Remaining illuminance inside at the bottom of a standardised tube. Beam obstructed by one mask	47 %	47 %
Remaining illuminance inside at the bottom of a standardised tube. Beam obstructed by two mask	45 %	45 %
Depth of illumination L1 + L2	120 cm	120 cm
Electrical data		
Primary voltage of transformer	100 / 120 / 127 V A.C. 220 / 230 / 240 V A.C.	
Power consumption	240 VA or 170 AV at 24 V D.C.	
Rated capacity of transformer / frequency	240 VA / 50/60 Hz	
Safety Category	1	
Protection provided by enclosure	IP 53	
General data		
Halogen bulb Order no.	22,8 V / 150 W CZ 908-22	
Life time of halogen bulb	1000 h	
Automatic switch over to reserve bulb	yes	

<b>Dimensions</b>	<b>D 650plus</b>
Diameter of light body	65 cm
Diameter of Polygon Reflectors	58,5 cm
Light emission surface (glass surface)	2370 cm <sup>2</sup>
Max. swivel radius	237 cm
Lowest position of light body	128 cm
Highest position of light body	226 cm
Clearance (single light)	200 cm at 265 cm finished ceiling
<b>Weight / Torque</b>	
Weight with transformer	50 kg
Max. torque	342 Nm
<b>Certificate</b>	 conform with 93/42 EEC UL listed


## 4.2 CHROMOPHARE® D 530plus, D 500plus

Light technical data	D 530plus		D 500plus	
Reflector system	Polygon reflector			
Colour temperature	4500plus K	3600 K	4500plus K	3600 K
Intensity Ec at 1 m [klx]	110	140	90	115
Intensity control [klx]	55 - 110	70 - 140	no	
Total radiant power at max intensity	410 W/m²	518 W/m²	336 W/m²	426 W/m²
Total radiant power/intensity Ec [mW/m²lux]	3,7			
Colour rendering index Ra	94			
Light field diameter	15 – 25 cm		17 cm	
d <sub>10</sub> Light field dia. at 10% of max intensity	15 cm		17 cm	
d <sub>50</sub> Light field dia. at 50% of max intensity	8 cm		8,5 cm	
Remaining illuminance when beam is obstructed by one mask	27 %		31 %	
Remaining illuminance when beam is obstructed by two mask	43 %		42 %	
Remaining illuminance inside at the bottom of a standardised tube.	100 %		100 %	
Remaining illuminance inside at the bottom of a standardised tube. Beam obstructed by one mask	27 %		31 %	
Remaining illuminance inside at the bottom of a standardised tube. Beam obstructed by two mask	43 %		42 %	
Depth of illumination L1 + L2	125 cm		125 cm	
Electrical data				
Primary voltage of transformer	100 / 120 / 127 V A.C. 220 / 230 / 240 V A.C.			
Power consumption	240 VA or 170 VA at 24 V D.C.			
Rated capacity of transformer / frequency	240 VA 50/60 Hz			
Safety Category	1			
Protection provided by enclosure	IP 53			
General data				
Halogen bulb at colour temperature 4500plus K Order no.	22,8 V / 150 W CZ 908-22			
Life time of halogen bulb	1000 h			
Automatic switch over to reserve bulb	yes			

<b>Dimensions</b>	<b>D 530plus</b>	<b>D 500plus</b>
Diameter of light body	52 cm	
Diameter of Polygon Reflectors	45,5 cm	
Light emission surface (glass surface)	1374 cm <sup>2</sup>	
Max. swivel radius	231 cm	
Lowest position of light body	130 cm	
Highest position of light body	219 cm	
Clearance (single light)	200 cm at 245 cm finished ceiling	
<b>Weight / Torque</b>		
Weight with. transformer	35 kg	
Max. torque	269 Nm	
<b>Certificate</b>	 conform with 93/42 EEC UL listed	


### 4.3 CHROMOPHARE® D 650

Light technical data	D 650	
Reflector system	Polygon reflector	
Colour temperature	4500 K	3600 K
Intensity Ec at 1 m [klx]	140	140
Intensity control [klx]	70 - 140	70 - 140
Total radiant power at max intensity	520 W/m <sup>2</sup>	
Total radiant power/intensity Ec [mW/m <sup>2</sup> lux]	3,7	
Colour rendering index R <sub>a</sub>	94	
Light field diameter	20 – 32 cm	17 – 30 cm
d <sub>10</sub> Light field dia. at 10% of max intensity	20 cm	17 cm
d <sub>50</sub> Light field dia. at 50% of max intensity	10 cm	9 cm
Remaining illuminance when beam is obstructed by one mask	59 %	50 %
Remaining illuminance when beam is obstructed by two mask	48 %	46 %
Remaining illuminance inside at the bottom of a standardised tube.	100 %	100 %
Remaining illuminance inside at the bottom of a standardised tube. Beam obstructed by one mask	59 %	50 %
Remaining illuminance inside at the bottom of a standardised tube. Beam obstructed by two mask	48 %	46 %
Depth of illumination L1 + L2	120 cm	120 cm
<b>Electrical data</b>		
Primary voltage of transformer	100 / 120 / 127 V A.C. 220 / 230 / 240 V A.C.	
Power consumption	370 VA or 270 VA at 24 V D.C.	240 VA or 170 AV at 24 V D.C.
Rated capacity of transformer / frequency	400 VA / 50/60 Hz	250 VA / 50/60 Hz
Safety Category	1	
Protection provided by enclosure	IP 53	

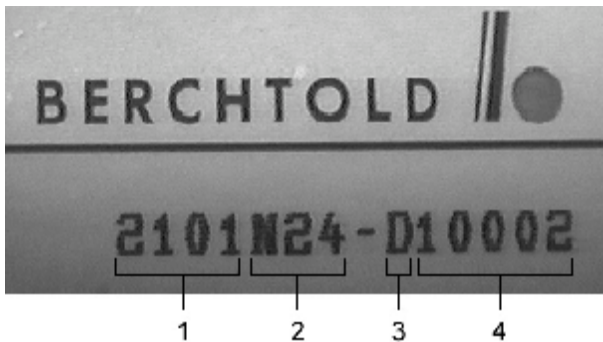
General data	D 650	
Halogen bulb Order no.	22,8 V / 250 W CZ 907-22	22,8 V / 150 W CZ 908-22
Life time of halogen bulb	1000 h	
Automatic switch over to reserve bulb	yes	
<b>Dimensions</b>		
Diameter of light body	65 cm	
Diameter of Polygon Reflectors	58,5 cm	
Light emission surface (glass surface)	2370 cm <sup>2</sup>	
Max. swivel radius	237 cm	
Lowest position of light body	128 cm	
Highest position of light body	226 cm	
Clearance (single light)	200 cm at 265 cm finished ceiling	
<b>Weight / Torque</b>		
Weight with transformer	50 kg	
Max. torque	342 Nm	
<b>Certificate</b>	 conform with 93/42 EEC UL listed	

#### 4.4 CHROMOPHARE® D 530, D 500

Light technical data	D 530		D 500	
Reflector system	Polygon reflector			
Colour temperature	4500 K	3600 K	4500 K	3600 K
Intensity Ec at 1 m [klx]	110		90	
Intensity control [klx]	55 - 110		no	
Total radiant power at max intensity	410 W/m²		336 W/m²	
Total radiant power/intensity Ec [mW/m²lux]	3,7			
Colour rendering index Ra	94			
Light field diameter	17 – 28 cm		17 cm	
d10 Light field dia. at 10% of max intensity	17 cm		17 cm	
d50 Light field dia. at 50% of max intensity	8,5 cm		10 cm	
Remaining illuminance when beam is obstructed by one mask	27 %		31 %	
Remaining illuminance when beam is obstructed by two mask	43 %		42 %	
Remaining illuminance inside at the bottom of a standardised tube.	100 %		100 %	
Remaining illuminance inside at the bottom of a standardised tube. Beam obstructed by one mask	27 %		31 %	
Remaining illuminance inside at the bottom of a standardised tube. Beam obstructed by two mask	43 %		42 %	
Depth of illumination L1 + L2	130 cm		130 cm	
Electrical data				
Primary voltage of transformer	100 / 120 / 127 V A.C. 220 / 230 / 240 V A.C.			
Power consumption	240 VA or 170 VA at 24 V D.C.	200 VA or 140 VA at 24 V D.C.	240 VA or 170 VA at 24 V D.C.	200 VA or 140 VA at 24 V D.C.
Rated capacity of transformer / frequency	240 VA / 50/60 Hz		140 VA / 50/60 Hz	
Safety Category	1			
Protection provided by enclosure	IP 53			

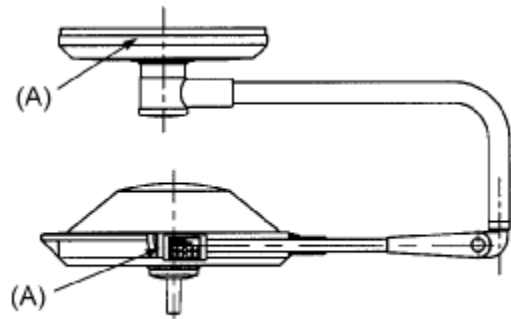
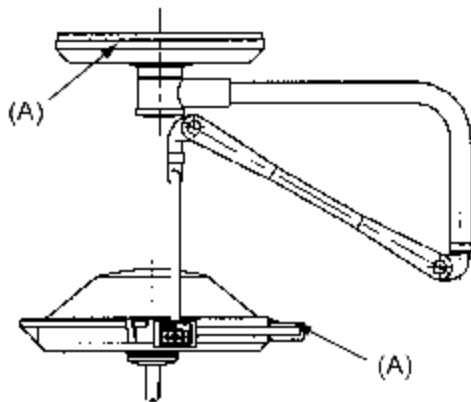
General data	D 530	D 500
Halogen bulb at colour temperature 4500 K Order no.	22,8 V / 150 W CZ 908-22	
Halogen bulb at colour temperature 3600 K Order no.	22,8 V / 110 W CZ 905-22	
Life time of halogen bulb	1000 h	
Automatic switch over to reserve bulb	yes	
<b>Dimensions</b>		
Diameter of light body	52 cm	
Diameter of Polygon Reflectors	45,5 cm	
Light emission surface (glass surface)	1374 cm <sup>2</sup>	
Max. swivel radius	231 cm	
Lowest position of light body	130 cm	
Highest position of light body	219 cm	
Clearance (single light)	200 cm at 245 cm finished ceiling	
<b>Weight / Torque</b>		
Weight with. transformer	35 kg	
Max. torque	269 Nm	
<b>Certificate</b>	 conform with 93/42 EEC UL listed	

## 5. SERIAL NO. IDENTIFICATION



### Type plate (A)

- 1 Version number
- 2 Variant
- 3 Manufacturing year
- 4 Serial number



## 6. SPARE PART LIST

### 6.1 CHROMOPHARE® D 650plus, D 650

Description	Part no.	Picture on page
Filtering board	65606	40
Reverse polarity protection	65601	41
Light intensity power circuit board	65604	42
Hexagon socket countersunk head screw	284	43
Locking pin	64174	43
Sliding contact	64186	43
Brake screw	38821	43
Cross recessed oval-head screw	277	43
Distance sleeve	64783	43
Cover	64171	43
Contact block for sliding contacts	39693	43
Cross recessed oval-head screw	235	43

Description	Part no.	Picture on page
Male sliding contact	65241	43
Female sliding contact	20002	43
Brake screw	64103	43
Cross recessed raised cheese head screw	45396	43
Mortise screw	64126	43
Brake screw	42805	44
Positioning screw	43009	44
Brake screw	42803	44
Ejot screw	64669	44
Hood	64101	44
Sealing rubber	64677	44
Screw	64235	44
Indication lamp yellow, with cable and connector	65637	44
Cover	51135	44
Rail holder	62252	44
Rail	64145	44
Test adapter	50574	45
Wiring harness	65769	45
Screw	68071	45
Brake screw M5x5	68072	45
Countersunk head screw M3x12	68073	45
Front part for touch control board	62402	45
Bumper, left	66320	46
Bumper, right	66319	46
Security lock – spring balanced arm	20010	46
Protection bush	20011	46
Washer	24197	46
Screw	11656	46
Guiding rod, with pressed socket for banana plug dia. 4 mm	64778	47
Filter glass assembly D 650plus	68618	47
Filter glass assembly D 650	64157	47
D.C. motor	67998	47 / 51
Control circuit board for centre positioning of main bulb	64176	48
Focusing mechanism for Standard and EndoLite®, without halogen bulb	64163	49
Guiding screw	64152	49

Description	Part no.	Picture on page
O-ring	64203	49
Cover	62418	49 / 50
Connection board for Standard	64162	49
Holder for bulb with connecting cables	64146	49
Housing for touch control board for Standard	62407	50
Touch control board with foil for Standard	68823	50
Touch control board with foil for Standard with EndoLite®	68824	51
Reserve bulb switch over circuit board without EndoLite®	65610	51
Focusing mechanism for LFN and LFN with EndoLite®, without halogen bulb	64673	52
IR-module	65643	52 / 53
Pressure spring	45173	52
Cover	64194	52 / 53
Connection board for LFN	64197	52
Motor for LFN	54860	53
Gearwheel	54849	54
Ring for sliding clutch	54809	54
LFN control	65608	54
Housing for touch control board for LFN and LFN with EndoLite®	62401	54
Touch control board with foil for LFN	68825	54
Touch control board with foil for LFN with EndoLite®	68826	55
Spare bulb 12V/20W for EndoLite®	CZ 960-12	55
Reserve bulb switch over circuit board with EndoLite®	65611	55

## 6.2 CHROMOPHARE® D 530plus, D 500plus, D 530, D 500

Description	Part no.	Picture on page
Filtering board	65606	40
Reverse polarity protection	65601	41
Light intensity power circuit board	65604	42
Hexagon socket countersunk head screw	284	43
Locking pin	64174	43
Sliding contact	64186	43
Brake screw	38821	43
Cross recessed raised cheese head screw	277	43
Distance sleeve	64783	43
Cover	64171	43
Contact block for sliding contacts	39693	43
Cross recessed countersunk head screw	235	43
Male sliding contact	65241	43
Female sliding contact	20002	43
Brake screw	64103	43
Cross recessed raised cheese head screw	45396	43
Mortise screw	64126	43
Brake screw	42805	44
Positioning screw	43009	44
Brake screw	42803	44
Ejot screw	64669	44
Hood	66333	44
Sealing rubber	66452	44
Screw	64235	44
Indication lamp yellow, with cable and connector	65637	44
Cover	51135	44
Rail holder	62252	44
Rail	66330	44
Test adapter	50574	45
Wiring harness	65769	45
Screw	68071	45
Brake screw M5x5	68072	45
Countersunk head screw M3x12	68073	45
Front part for touch control board	62402	45

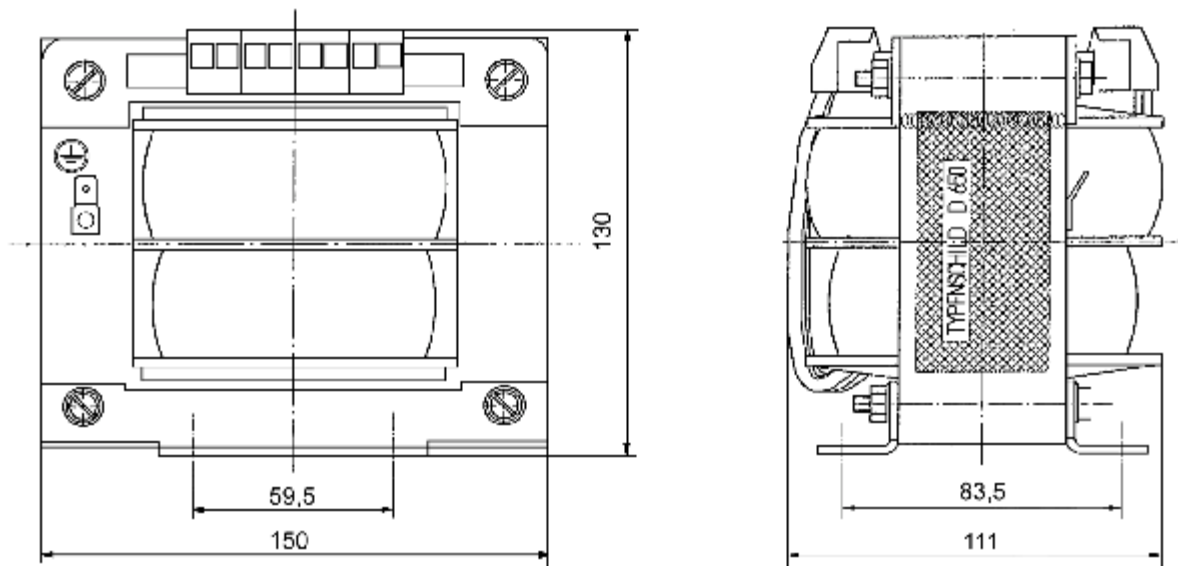
<b>Description</b>	<b>Part no.</b>	<b>Picture on page</b>
Bumper, left	66320	46
Bumper, right	66319	46
Housing for touch control board for D 530plus, D 530	62407	50
Touch control board for D 530plus, D 530 Standard	68823	50
Touch control board for D 530plus, D 530 Standard with EndoLite®	68824	51
Reserve bulb switch over circuit board without EndoLite®, D 530plus D 530	65610	51
Spare bulb 12V/20W for EndoLite®	CZ 960-12	55
Reserve bulb switch over circuit board with EndoLite®, D 530plus D 530	65611	55
Security lock – spring balanced arm	20010	56
Protection bush	20011	46
Washer	24197	56
Screw	11656	56
Guiding rod, with pressed socket for banana plug dia. 4 mm for D 530plus, D 530	66406	57
Guiding rod, with pressed socket for banana plug dia. 4 mm for D 500plus, D 500	66405	57
Filter glass assembly for D 530plus, D 530	66409	57
Filter glass assembly for D 500plus, D 500	66457	57
Focusing mechanism for Standard and EndoLite®, without halogen bulb, for D 530plus, D 530	66421	58
Holder for bulb	64146	58 / 59
Screw, lower stop	66422	58
Screw, upper stop	66423	58
Cover	62418	58 / 59
Knurled screw	64142	58 / 59
O-ring	64203	58 / 59
Connection board for Standard	64162	58 / 60
Focusing mechanism for Standard, without halogen bulb, for D 500plus, D 500	66419	59
Threaded rod	38593	59
Touch control board for D 500plus, D 500	66417	60
Housing for touch control board for D 500plus, D 500	66416	60
Countersunk-head screw M3x16	103	60
Circuit board On/Off for D 500plus, D 500	68015	60

## 7. TRANSFORMERS

### 7.1 CHROMOPHARE® D 650

**CHROMOPHARE® D 650plus, D 530plus, D 500plus**

**Mounting separate from the ceiling tube, distance of transformer to ceiling tube over 20 m**



CB 502-40 Transformer mounted on flange tube 220/230/240V / 400 VA

CB 505-40 Transformer mounted separately 220/230/240V / 400 VA

CB 502-42 Transformer mounted on flange tube 100/120/127 V / 400 VA

CB 505-42 Transformer mounted separately 100/120/127 V / 400 VA

#### **How to proceed the transformer adjustment (with topped filtering board):**

1. Measuring of the terminal voltage on the ceiling terminal.
2. The terminal voltage of the emergency supply is similar to the reference value (D.C.). The reference value (D.C.) is measured on the ceiling tube's terminal connection situated behind the filtering board. The secondary tap on the transformer should be chosen in that way that the above measured reference value (D.C.) is reached. This procedure is valid for separately mounted transformers with filtering board as well as on ceiling tube mounted transformers with filtering board.

The following taps can be chosen:

Primary terminal main voltage			Secondary terminal	approx. A.C. voltage at filtering board input	approx. D.C. voltage at filtering board output
Trafo CB 502-42 or CB 505-42					
100 V	120 V	127 V			
Trafo CB 502-40 or CB 505-40					
220 V	230 V	240 V		A.C. [V]	D.C. [V]
1 / 5	1 / 6	1 / 7	8 / 9	21.5	24.0
2 / 5	2 / 6	2 / 7	8 / 9	22.0	24.6
3 / 5	3 / 6	3 / 7	8 / 9	22.5	25.1
1 / 5	1 / 6	1 / 7	8 / 10	23.5	26.3
2 / 5	2 / 6	2 / 7	8 / 10	24.0	26.8
3 / 5	3 / 6	3 / 7	8 / 10	24.5	27.4
1 / 5	1 / 6	1 / 7	8 / 11	25.0	28.0
2 / 5	2 / 6	2 / 7	8 / 11	25.5	28.5
3 / 5	3 / 6	3 / 7	8 / 11	26.0	29.0

**Example 1:**

Transformer and filtering board are mounted on the ceiling tube, emergency supply 25.0 V D.C. under load (reference value) on the terminal connection of the ceiling tube.

The transformer tap corresponds to 230 V supply voltage, 3 / 6 for the primary connection and 8 / 9 for the secondary tap.

**Example 2:**

Transformer and filtering board are mounted in the wall box, emergency supply 25.5 V D.C. under load (reference value) on the terminal connection of the ceiling tube.

The wire's voltage drop is 2 V.

The transformer tap corresponds to 230 V supply voltage, 3 / 6 for the primary connection and 8 / 10 for the secondary tap.

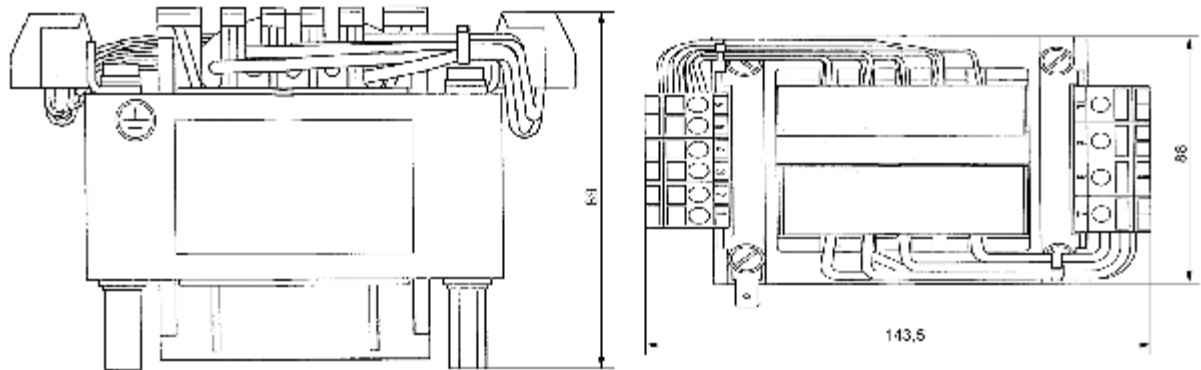
**Attention:**

If the transformer and the filtering board are mounted separately, the wire's voltage drop between the filtering board's output and the terminal connection of the ceiling tube has to be taken into account accordingly.

If the transformer is mounted on the ceiling tube, the smallest secondary tap (21.5 V) has to be chosen. After the rectification on the filtering board, the above mentioned value corresponds to a D.C. voltage of ca. 24.0 V under load.

## 7.2 CHROMOPHARE® D 650plus, D 530plus, D 500plus, D 530, D 500

Mounting on the ceiling tube and separate from the ceiling tube, distance of transformer to ceiling tube 20 m



CB 502-32 Transformer mounted on flange tube 220/230 V/240 VA

CB 505-32 Transformer mounted separately 220/230 V/240 VA

CB 502-30 Transformer mounted on flange tube 100/120/127 V/240 VA

CB 505-30 Transformer mounted separately 100/120/127 V/240 VA

### How to proceed the transformer adjustment (with topped filtering board):

1. Measuring of the terminal voltage on the ceiling terminal.

2. The terminal voltage of the emergency supply is similar to the reference value (D.C.). The reference value (D.C.) is measured on the ceiling tube's terminal connection situated behind the filtering board. The secondary tap on the transformer should be chosen in that way that the above measured reference value (D.C.) is reached. This procedure is valid for separately mounted transformers with filtering board as well as on ceiling tube mounted transformers with filtering board.

The following taps can be chosen:

Primary terminal main voltage			Secondary terminal	approx. A.C. voltage at filtering board input	approx. D.C. voltage at filtering board output
Trafo CB 502-30 or CB 505-30					
100 V	120 V	127 V			
Trafo CB 502-32 or CB 505-32					
220 V	230 V	240 V		A.C. [V]	D.C. [V]
1 / 4	1 / 5	1 / 6	7 / 8	21.0	24.0
2 / 4	2 / 5	2 / 6	7 / 8	21.5	24.6
3 / 4	3 / 5	3 / 6	7 / 8	22.0	25.1
1 / 4	1 / 5	1 / 6	7 / 9	23.0	26.3
2 / 4	2 / 5	2 / 6	7 / 9	23.5	26.8
3 / 4	3 / 5	3 / 6	7 / 9	24.0	27.4
1 / 4	1 / 5	1 / 6	7 / 10	24.5	28.0
2 / 4	2 / 5	2 / 6	7 / 10	25.0	28.5
3 / 4	3 / 5	3 / 6	7 / 10	25.5	29.0

#### Example 1:

Transformer and filtering board are mounted on the ceiling tube, emergency supply 25.0 V D.C. under load (reference value) on the terminal connection of the ceiling tube.

The transformer tap corresponds to 230 V supply voltage, 3 / 5 for the primary connection and 7 / 8 for the secondary tap.

#### Example 2:

Transformer and filtering board are mounted in the wall box, emergency supply 25.5 V D.C. under load (reference value) on the terminal connection of the ceiling tube.

The wire's voltage drop is 2.0 V.

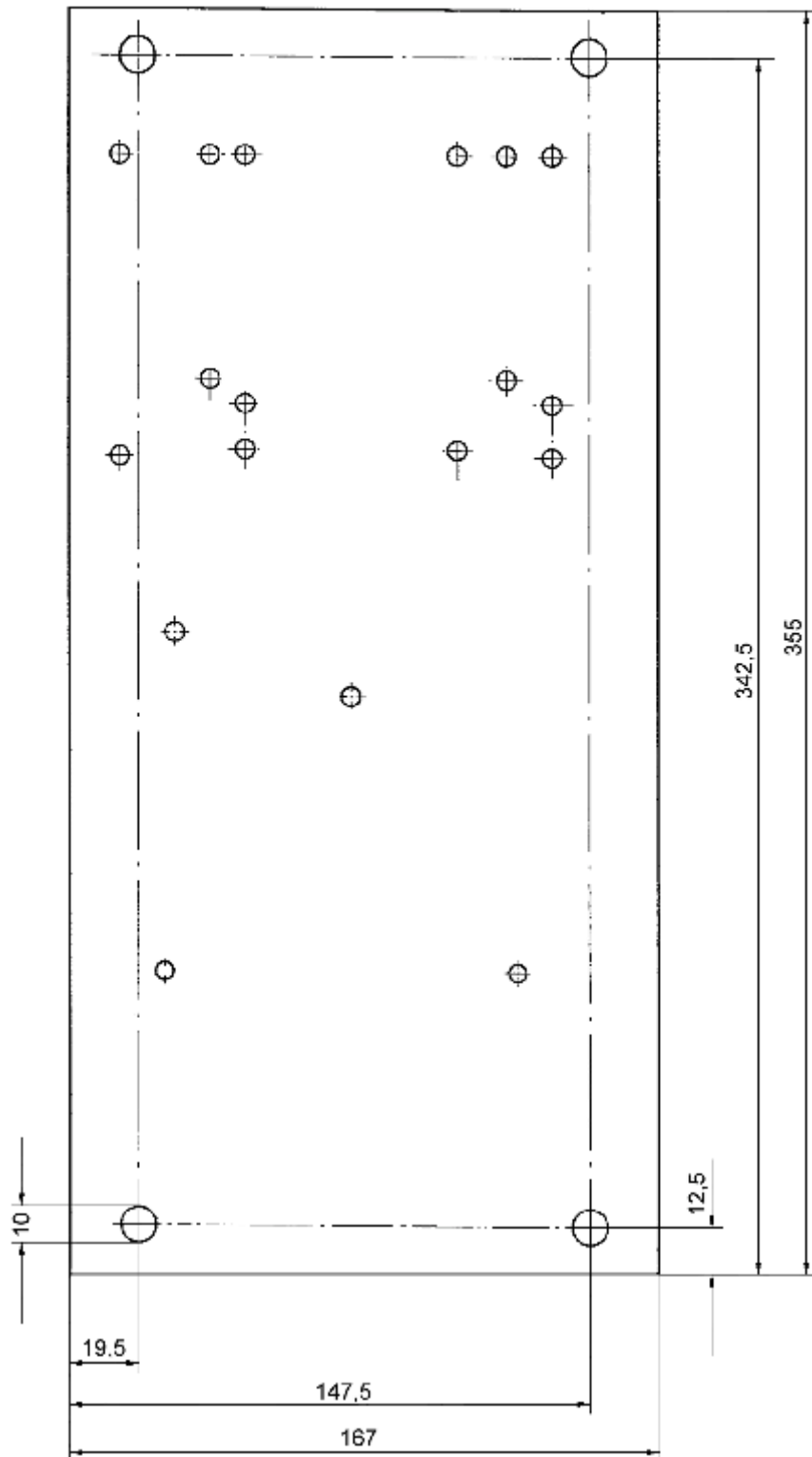
The transformer tap corresponds to 230 V supply voltage, 3 / 5 for the primary connection and 7 / 9 for the secondary tap.

#### Attention:

If the transformer and the filtering board are mounted separately, the wire's voltage drop between the filtering board's output and the terminal connection of the ceiling tube has to be taken into account accordingly.

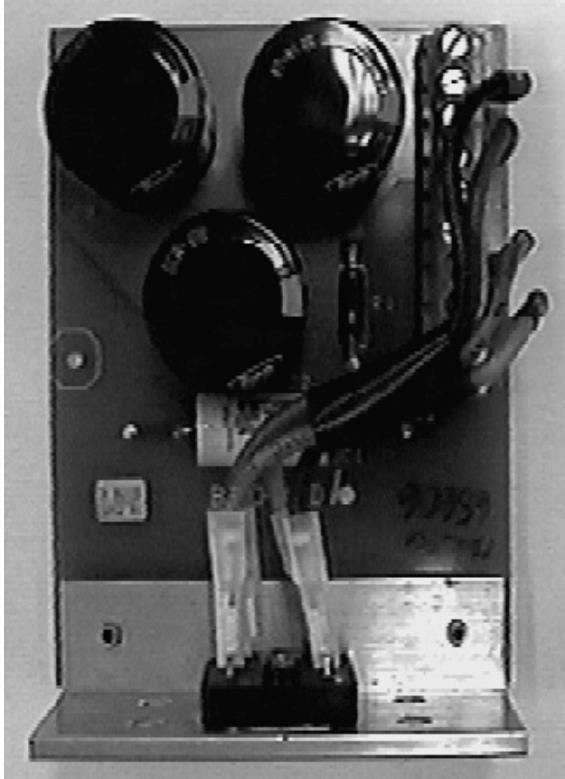
If the transformer is mounted on the ceiling tube, the smallest secondary tap (21.0 V) has to be chosen. After the rectification on the filtering board, the above mentioned value corresponds to a D.C. voltage of ca. 24.0 V under load.

**Drilling measurements mounting plate - supply unit**  
Planting depth min 200 mm



## 8. GRAPHIC SPARE PART DESCRIPTION

### 8.1 CHROMOPHARE® generation D complete

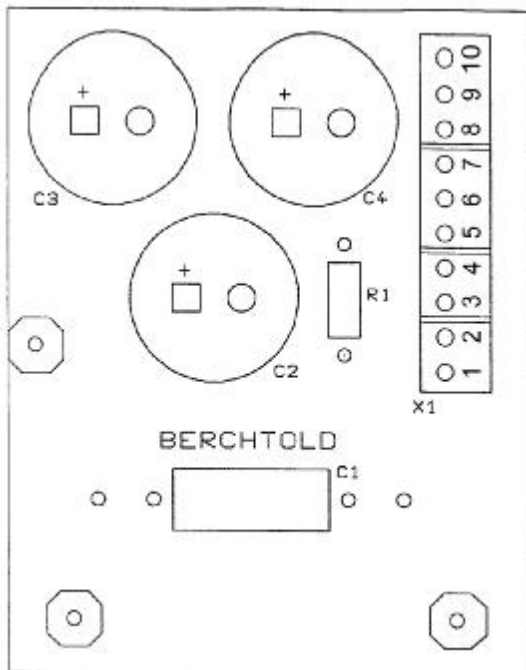


Filtering board, part no. 65606

**Note!**

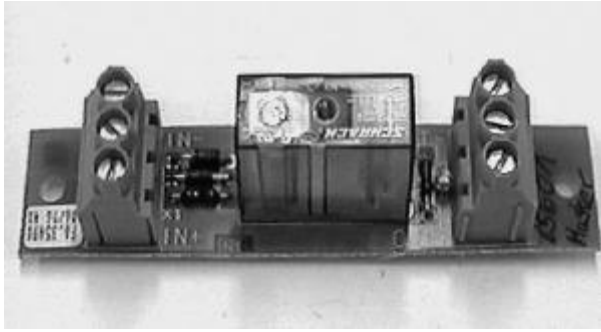
Due to the EMV conditions, the filtering board has generally to be connected and installed as near as possible to the transformer.

Please consider that the installed filtering board should be able to eliminate heat through a large surface.



- 1 AC K9, to emergency relays
- 2 AC V1
- 3 AC Transformer input
- 4 AC V1
- 5 AC Transformer input
- 6 AC K9, to emergency relays
- 7 + V1
- 8 + out, to light 24 – 27 V D.C.
- 9 – V1
- 10 – out, to light 24 – 27 V D.C.

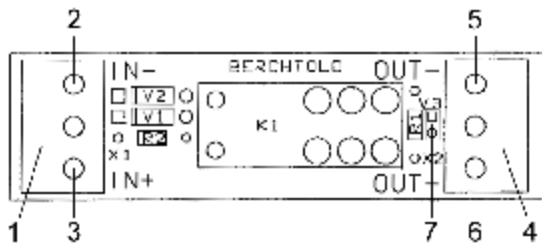
The wiring diagram please see page 72 - 95



#### Reverse polarity protection, part no. 65601

In BERCHTOLD plant, a reverse polarity protection module (part no. 65602) with fixation D 650plus, D 650 is installed on every ceiling tube. If welded central columns are used, the module is installed on the flange. A green LED on the reverse polarity protection module indicates the correct polarity, the presence of voltage as well as the functioning of the reverse polarity protection module.

All models with BERCHTOLD wall box have the reverse polarity protection module inside the wall box, where it is preconnected to the electronics.



1 input terminal: input voltage  
24 – 27 V D.C.

2 - (negative) input (black cable)

3 + (positive) input (red cable)

4 output terminal: output voltage  
24 – 27 V D.C.

5 - (negative) to light body (black cable)

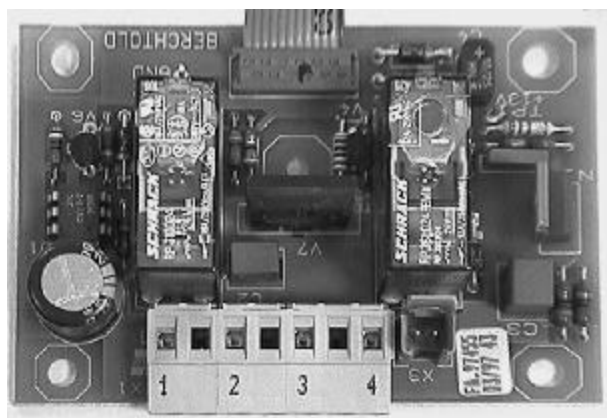
6 + (positive) to light body (red cable)

7 **indication LED V3**

**green indication = polarity o.k.**

**red indication = wrong polarity or A.C.**

**no indication = no voltage connected**



Light intensity power circuit board, part no. 65604

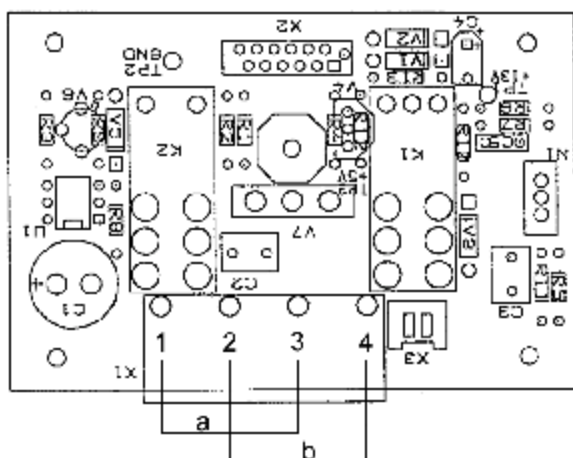
**Attention!**

No A.C. voltage must be fed into the electronics. A direct supply of A.C. voltage always destroys the light electronics.

If only A.C. voltage is available, the filtering board (part no. 65606) has always to be preconnected to the light electronics.

If only D.C. voltage is available, preconnecting of the filtering board is not necessary.

If A.C. voltage (main supply) and D.C. voltage (supplementary supply) are available, the filtering board (part no. 65606) has always to be preconnected to the light electronics in the main supply circuitry.



a input 23 – 26 V D.C.

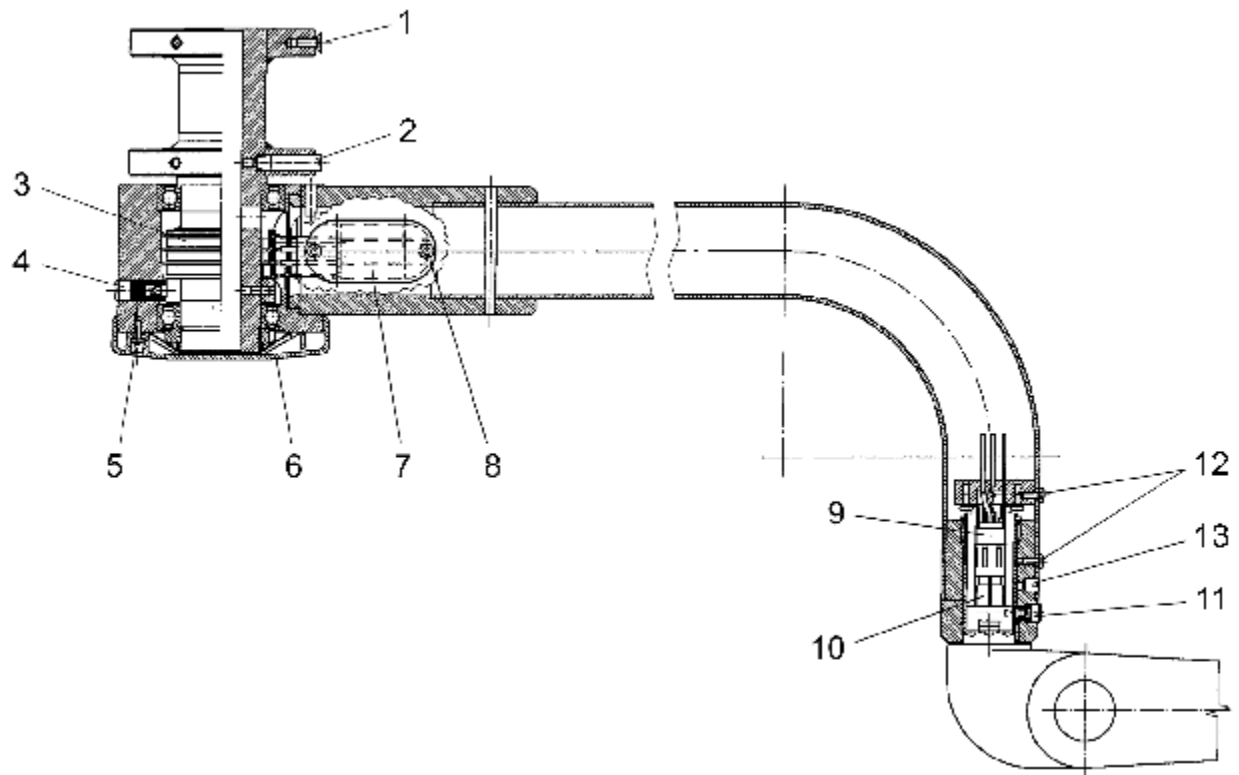
b output to light body max. 22,6 V A.C./D.C.

1 black - (negative)

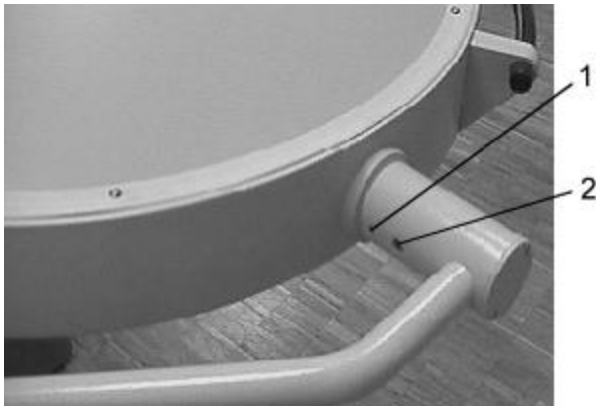
2 black - (negative)

3 red + (positive)

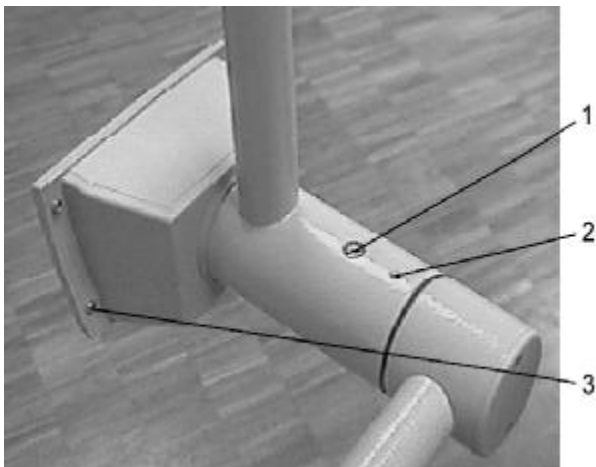
4 red + (positive)



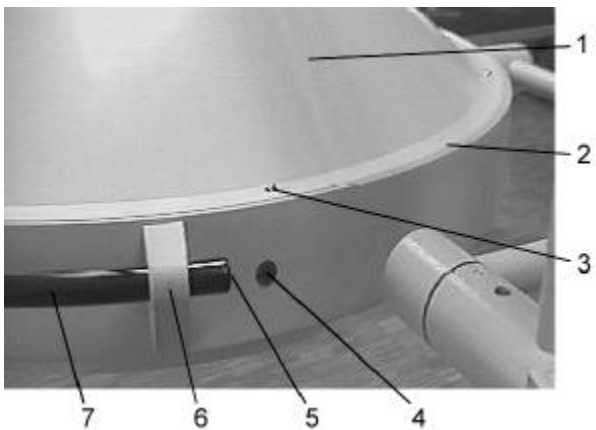
- |  |  |
|--|--|
| 1 5 x Hexagon socket countersunk head screw,<br>part no. 284, minimal torque 23 Nm       | 8 2 x cross recessed countersunk head screw,<br>part no. 235 |
| 2 Locking pin, part no. 64174  | 9 Male sliding contact, part no. 65241                       |
| 3 Sliding contact, part no. 64186  | 10 Female sliding contact, part no. 20002                    |
| 4 Brake screw, part no. 38821  | 11 Brake screw, part no. 64103                               |
| 5 Cross recessed oval-head screw,<br>part no. 277<br>and distance sleeve, part no. 64783 | 12 Cross recessed oval-head screw,<br>part no. 45396         |
| 6 Cover, part no. 64171  | 13 Mortise screw, part no. 64126                             |
| 7 Contact block for sliding contacts, part no. 39693                                     |  |



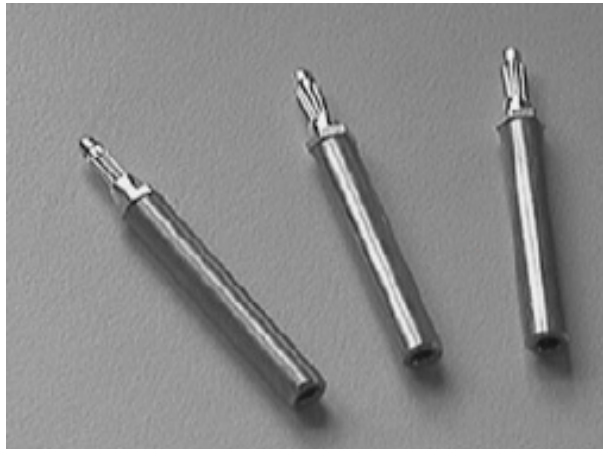
- 1 Brake screw, part no. 42805
- 2 Security screw, part no. 43009



- 1 Security screw, part no. 43009
- 2 Brake screw, part no. 42803
- 3 Ejot screw, part no. 64669



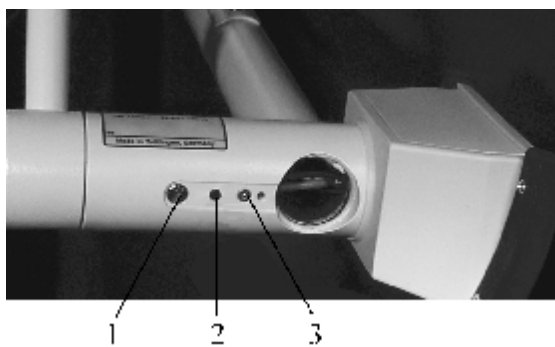
- 1 Hood D 650plus, D 650, part no. 64101  
Hood D 530plus, D 500plus, D 530, D 500  
part no. 66333
- 2 Sealing rubber D 650plus, D 650, part no. 64677  
Sealing rubber D 530plus, D 500plus, D 530 D 500,  
part no. 66452
- 3 Screw, part no. 64235
- 4 Indication lamp, yellow, with cable and connector  
part no. 65637
- 5 Cover D650plus, D 530plus D 650, D 530,  
part no. 51135
- 6 Rail holder D650plus, D 530plus D 650, D 530,  
part no. 62252
- 7 Rail D 650plus, D 530plus, part no. 64145  
Rail D 530plus, D 530, part no. 66330



Test adapter for check of the halogen bulb supply voltage and check of the switch over function to reserve bulb  
part no. 50574



Wiring harness, from electronic to reflector connector,  
part no. 65769



- 1 Screw, part no. 68071
- 2 Brake screw M5x5, part no. 68072
- 3 Countersunk head screw M3x12, part no. 68073



Front part for touch control board, part no. 62402

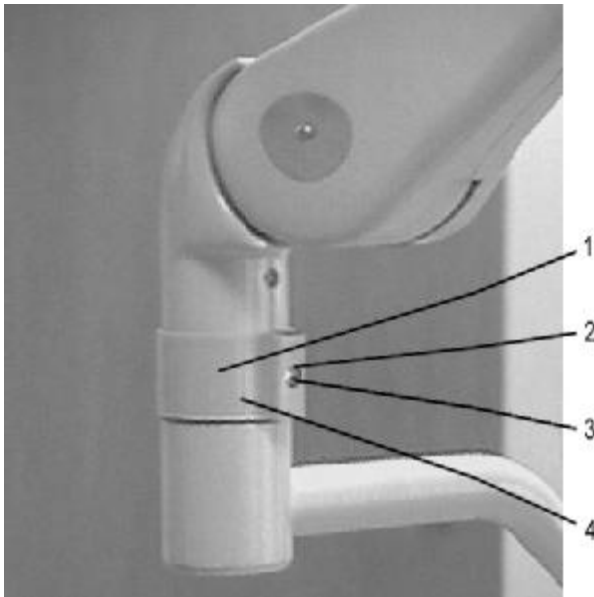


- 1 Bumper left, part no. 66320
- 2 Bumper right, part no. 66319

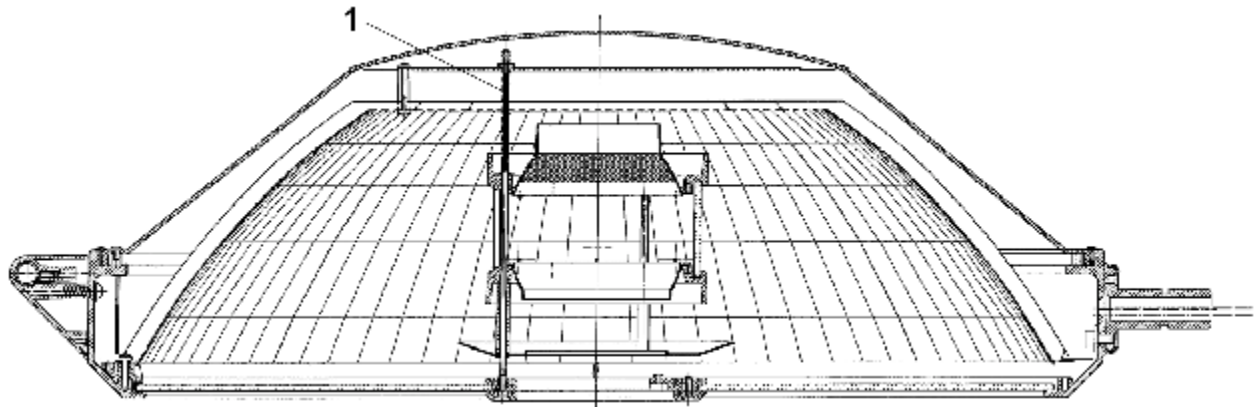


Security lock – spring balanced arm, part no. 20010

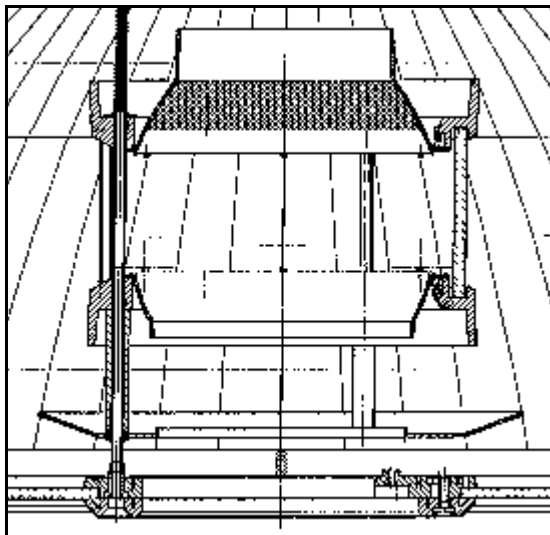
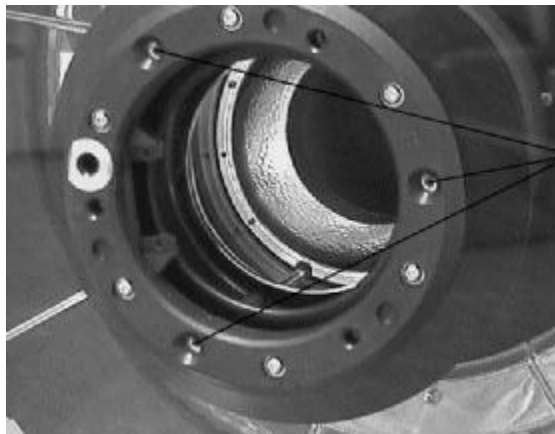
## 8.2 CHROMOPHARE® D 650plus, D 650



- 1 Protection bush, part no. 20011
- 2 Washer, part no. 24197
- 3 Screw, part no. 11656
- 4 Security lock – spring balanced arm, (not visible) part no. 20010



- 1 Guiding rod, with pressed socket for banana plug dia. 4 mm  
part no. 64778

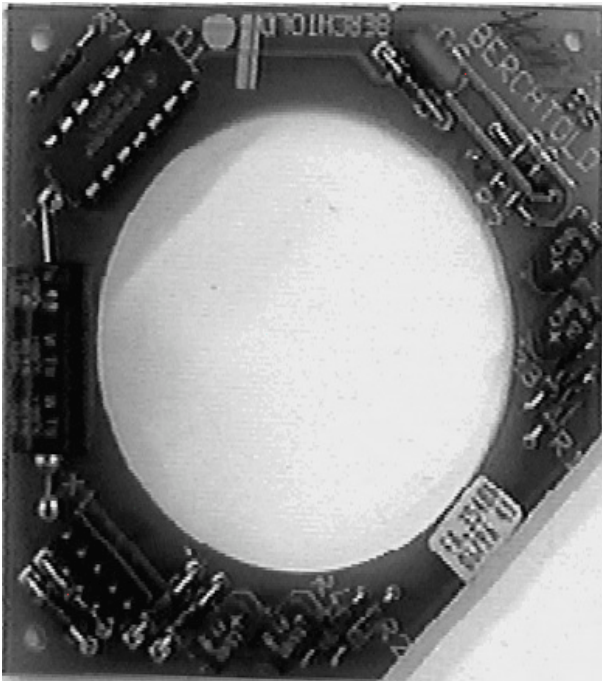


Filter glass assembly D 650plus, part no 68618

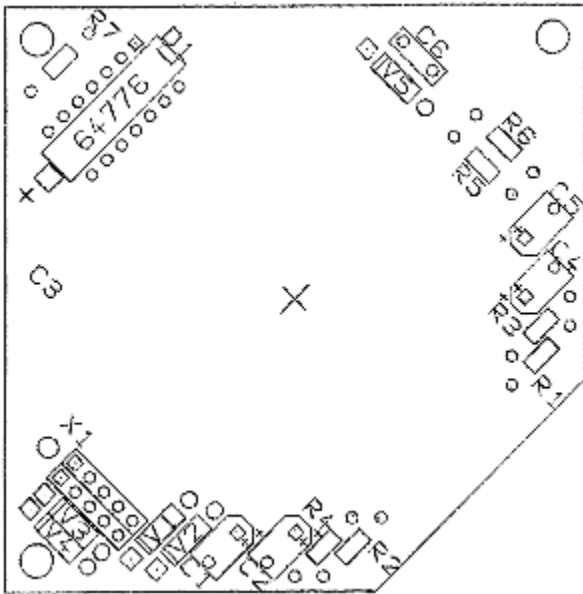
Filter glass assembly D 650, part no. 64157



D.C. motor with cable and connector, mounted in the focusing mechanism,  
part no. 67998

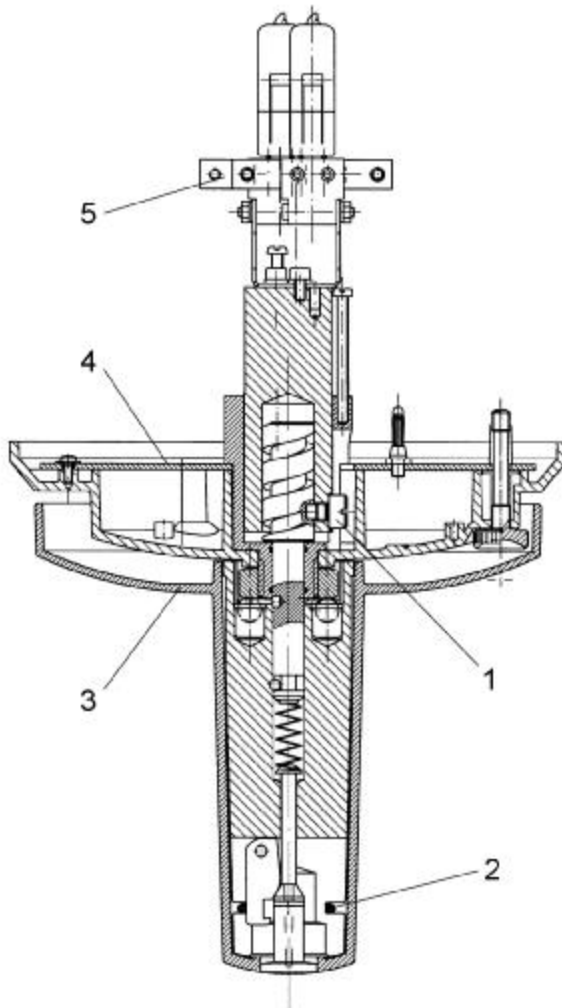


Control circuit board for centre positioning of main bulb,  
part no. 64176

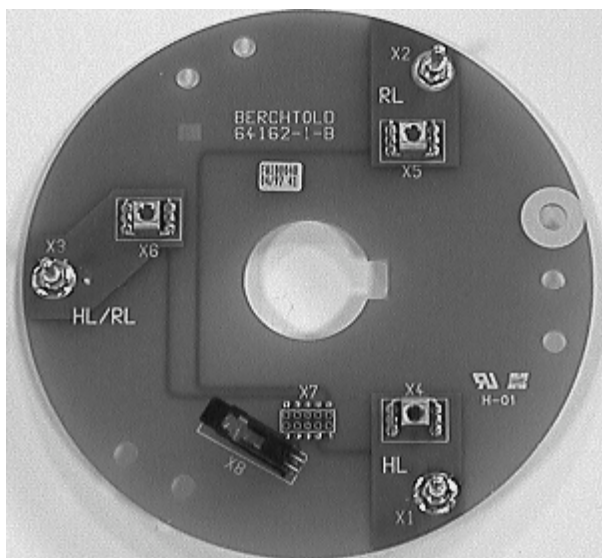


### 8.3 CHROMOPHARE® D 650plus, D 650 version Standard and EndoLite®

Focusing mechanism for Standard and EndoLite® without halogen bulbs, part no. 64163



- 1 Guiding screw, part no. 64152
- 2 O-ring, part no. 64203
- 3 Cover, part no. 62418
- 4 Connection board Standard, part no. 64162
- 5 Holder for bulb with connecting cables without halogen bulbs, part no. 64146



Connection board Standard, part no. 64162

HL = Main bulb

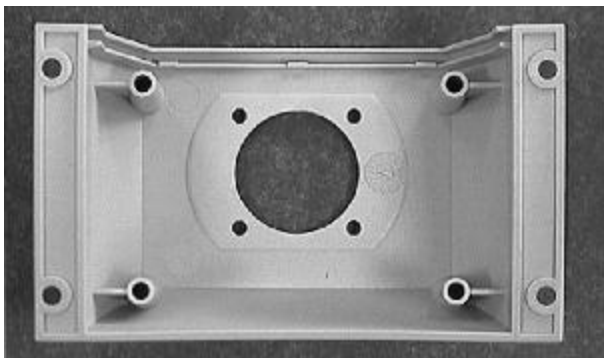
RL = Reserve bulb

HL/RL = Main and reserve bulb

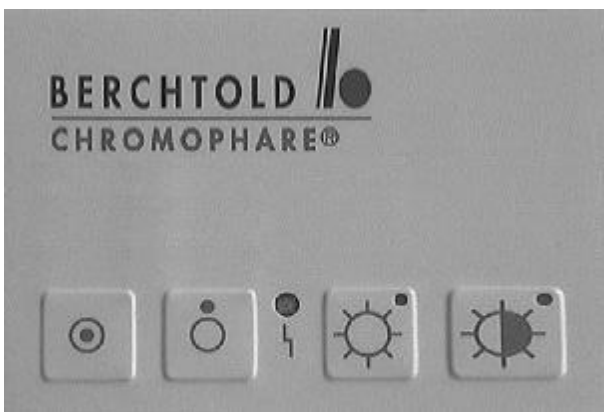


Cover, part no. 62418

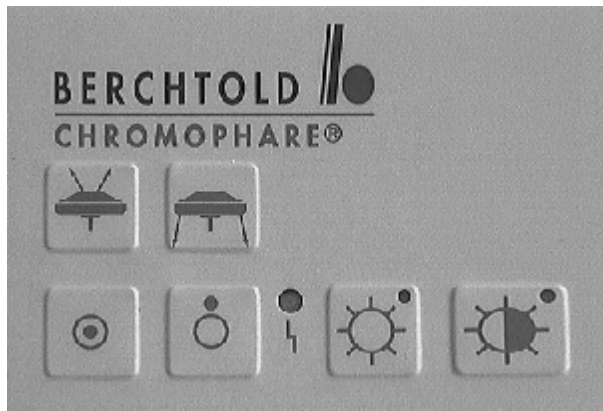
#### 8.4 CHROMOPHARE® D 650plus, D 530plus, D 650, D 530



Housing for touch control board, part no. 62407

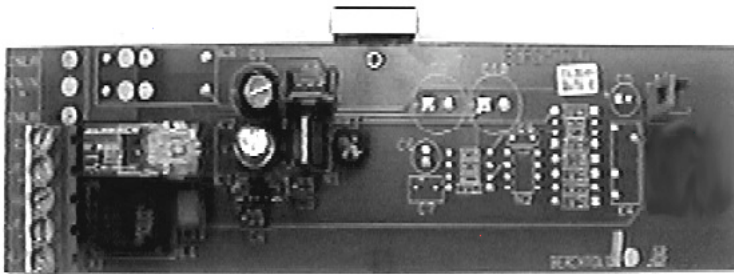


Touch control board with foil for Standard,  
part no. 68823

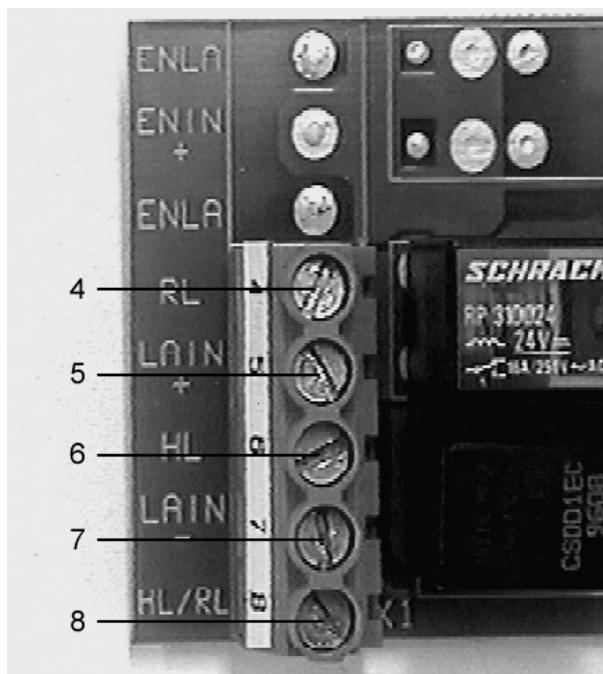


Touch control board with foil for Standard with EndoLite®  
part no. 68824

#### 8.5 CHROMOPHARE® D 650plus, D 530plus, D 650, D 530 version Standard without EndoLite®

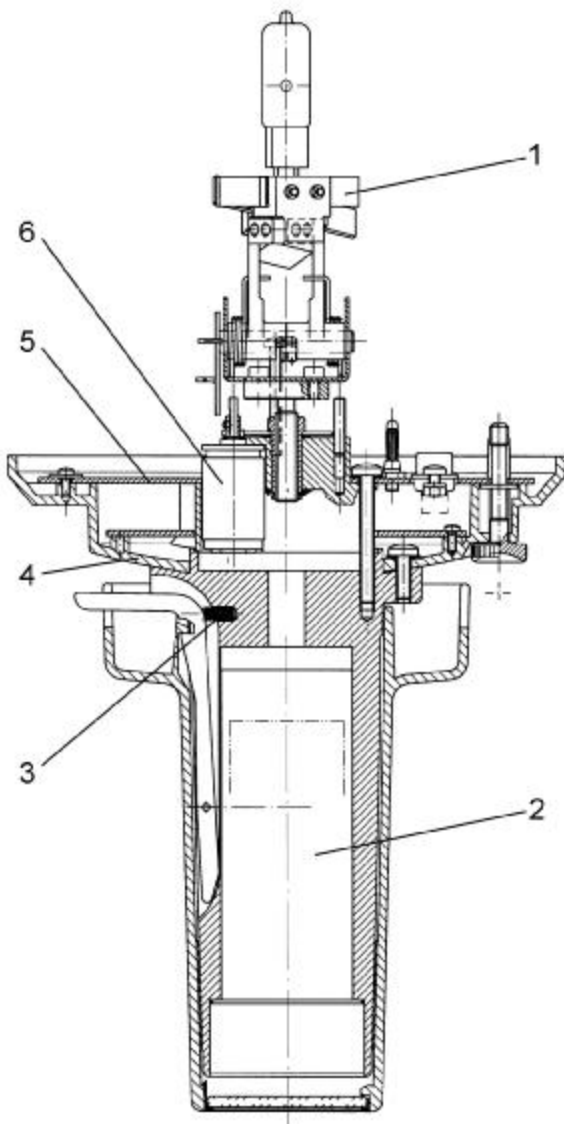


Reserve bulb switch over circuit board without EndoLite®  
(mounted in the light body)  
part no. 65610



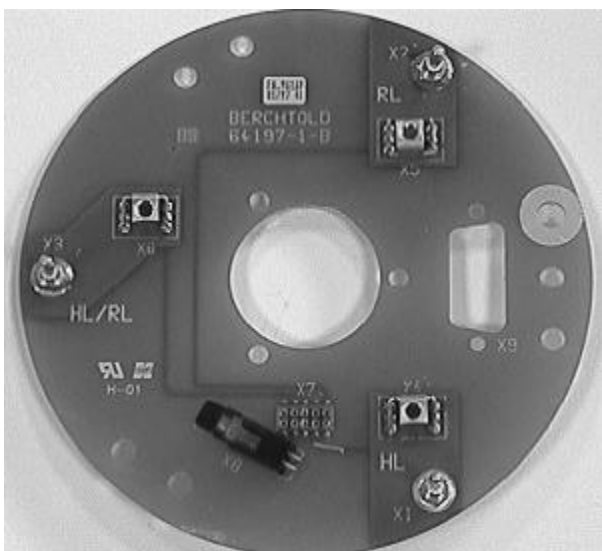
- 4 to reserve bulb (RL)
- 5 (+) input, coming from light intensity power circuit board (LAIN +)
- 6 to main bulb (HL)
- 7 (-) input, coming from light intensity power circuit board (LAIN -)
- 8 common cable to main and reserve bulb (HL/RL)

## 8.6 CHROMOPHARE® D 650plus, D 650 version light field plotting model LFN



Focusing mechanism for LFN and LFN with EndoLite® without halogen bulbs, part no. 64673

- 1 Holder for bulb with connecting cables without halogen bulbs, part no. 64146
- 2 IR-module, part no. 65643
- 3 Pressure spring, part no. 45173
- 4 Cover, part no. 64194
- 5 connection board for LFN, part no. 64197
- 6 D.C. motor, part no. 67998

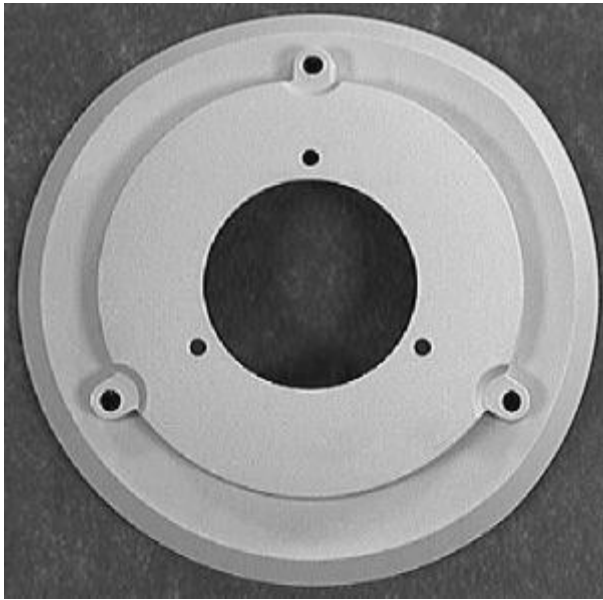


Connection board for LFN or CCD, part no. 64197

HL = Main bulb

RL = Reserve bulb

HL/RL = Main and reserve bulb



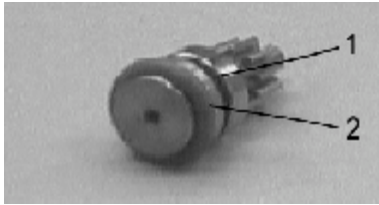
Cover, part no. 64194



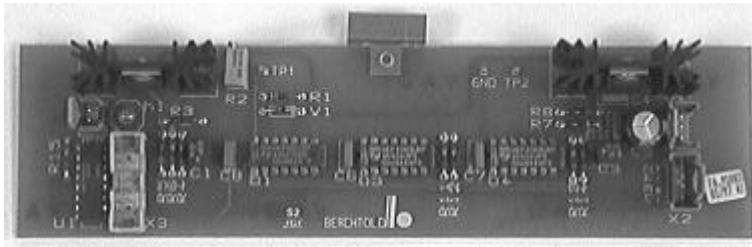
IR-module, part no. 65643



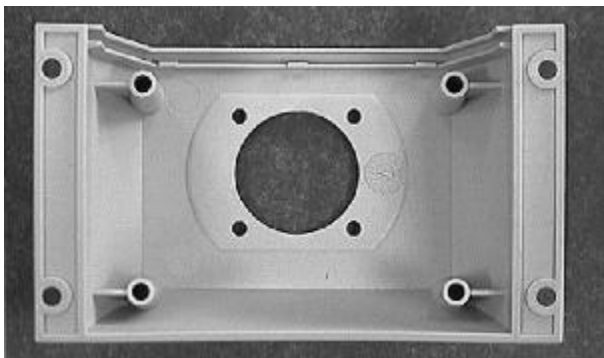
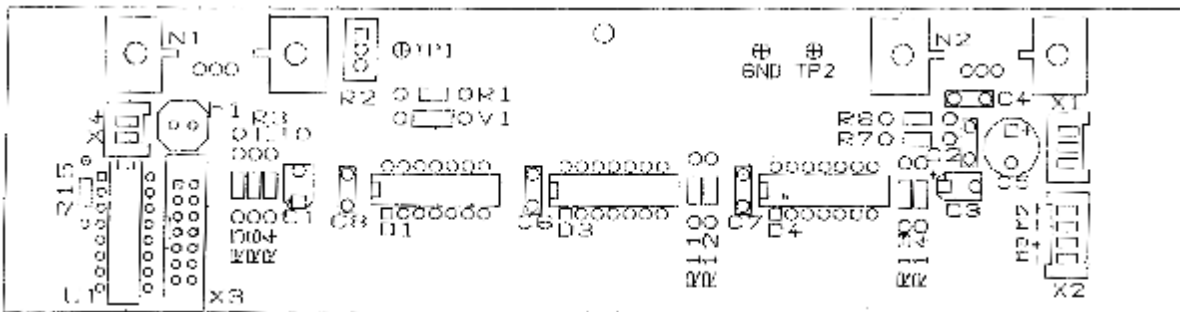
Motor for LFN, part no. 54860



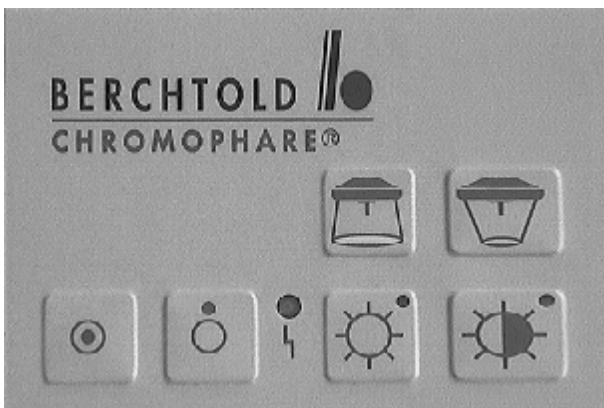
- 1 Gearwheel, part no. 54849
- 2 Ring for sliding clutch, part no. 54809



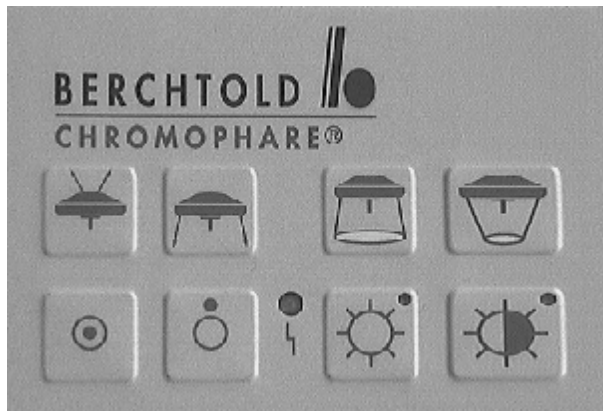
LFN control, part no. 65608



Housing for touch control board for LFN and LFN with EndoLite®  
part no. 62401

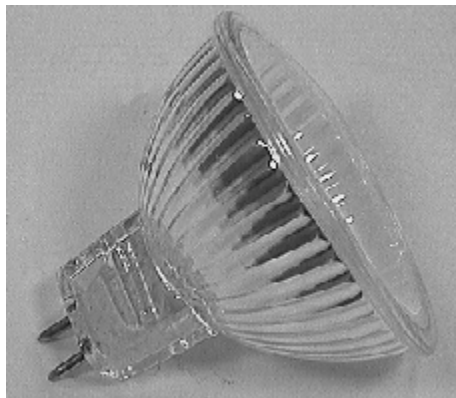


Touch control board with foil for LFN part no. 68825

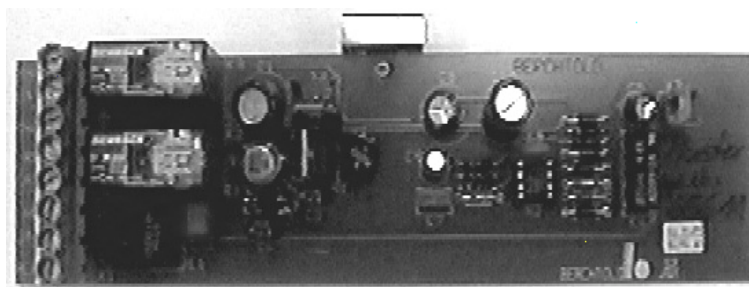


Touch control board with foil for LFN with EndoLite®  
part no. 68826

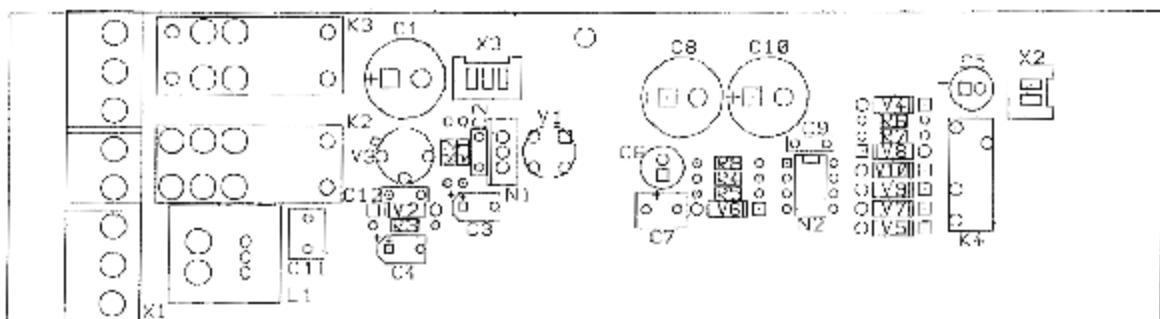
### 8.7 CHROMOPHARE® D 650plus, D 530plus, D 650, D 530 version with EndoLite®



EndoLite®, spare bulb 12V/20W, with glass disc and  
reflector,  
part no. CZ 960-12



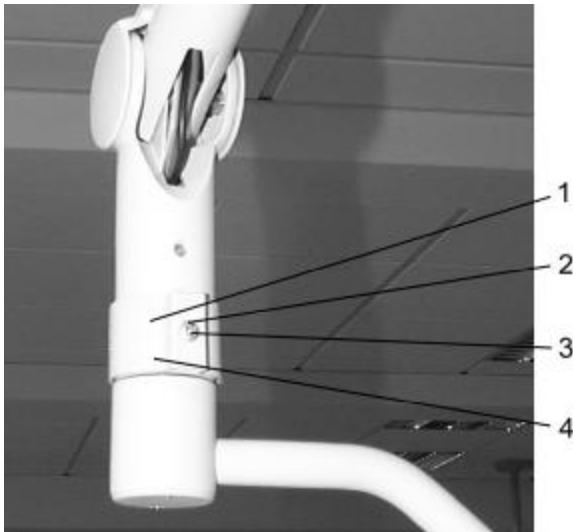
Reserve bulb switch over circuit board  
with EndoLite®  
(mounted in the light body)  
part no. 65611





A to EndoLite®, max. 11,0 V A.C. / D.C.

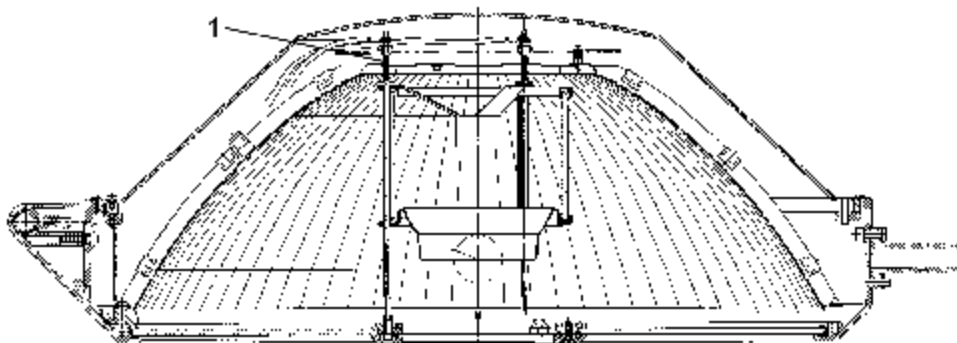
### 8.8 CHROMOPHARE® D 530plus, D 500plus, D 530, D 500

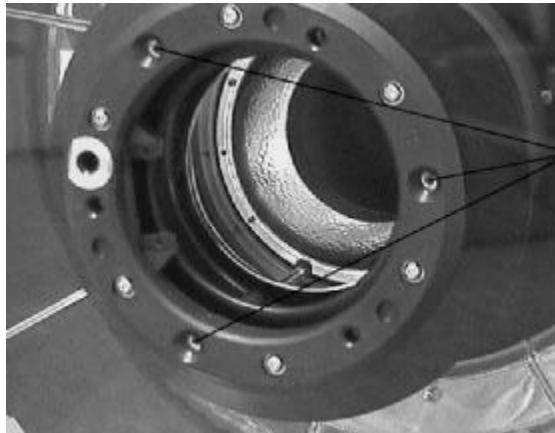


- 1 Protection bush, part no. 20011
- 2 Washer, part no. 24197
- 3 Screw, part no. 11656
- 4 Security lock – spring balanced arm, (not visible) part no. 20010



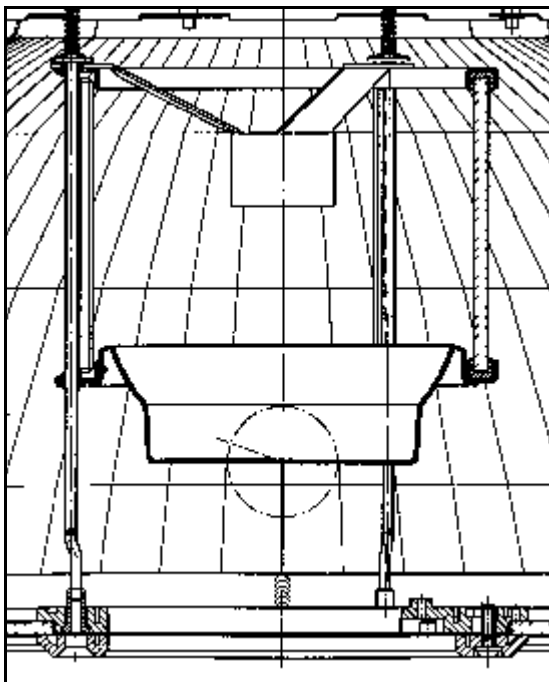
Security lock – spring balanced arm, part no. 20010





- 1 **D 530plus, D 530:**  
Guiding rod, with pressed socket for banana plug dia.  
4 mm  
part no. 66406

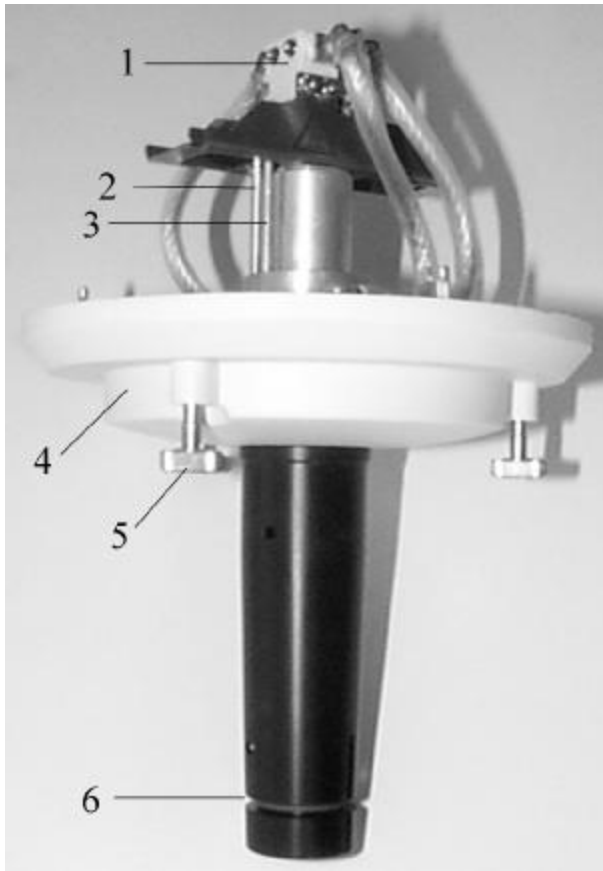
**D 500plus, D 500:**  
Guiding rod, with pressed socket for banana plug dia.  
4 mm  
part no. 66405



**D 530plus, D 530:**  
filter glass assembly, part no. 66409

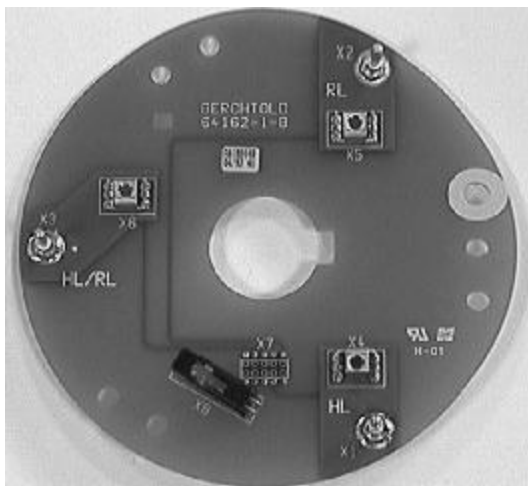
**D 500plus, D 500:**  
filter glass assembly, part no. 66457

## 8.9 CHROMOPHARE® D 530plus, D 530 version Standard and EndoLite®



Focusing mechanism for Standard and EndoLite® without halogen bulbs, part no. 66421

- 1 Holder for bulb, part no. 64146
- 2 Screw, lower stop, part no. 66422
- 3 Screw, upper stop, part no. 66423
- 4 Cover, part no. 62418
- 5 Knurled screw, part no. 64142
- 6 O-ring, part no. 64203



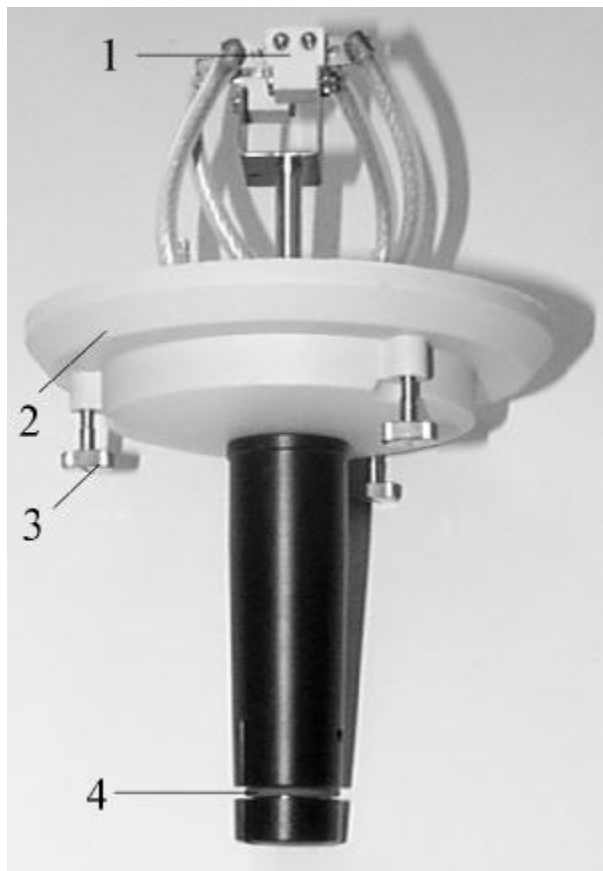
Connection board for Standard, part no. 64162

HL = Main bulb

RL = Reserve bulb

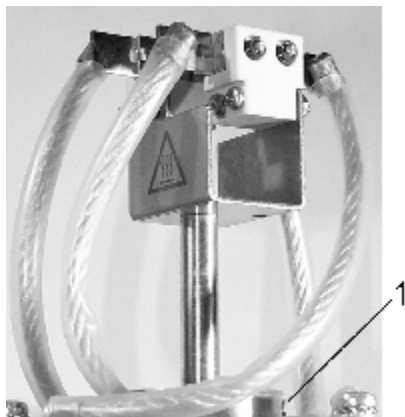
HL/RL = Main and reserve bulb

## 8.10 CHROMOPHARE® D 500plus, D 500 version Standard



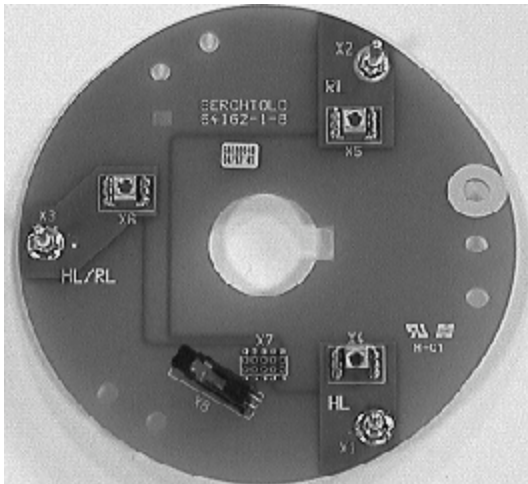
Focusing mechanism for Standard without halogen bulbs, part no. 66419

- 1 Holder for bulb, part no. 64146
- 2 Cover, part no. 64418
- 3 Knurled screw, part no. 64142
- 4 O-ring, part no. 64203



Focusing mechanism D 500plus, D 500

- 1 Threaded rod, part no. 38593



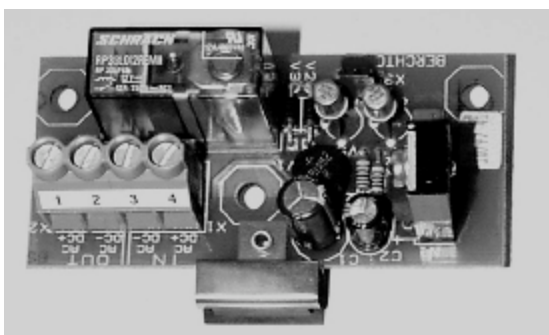
Connection board for Standard, part no. 64162

HL = Main bulb

RL = Reserve bulb

HL/RL = Main and reserve bulb

- 1 Touch control board for D 500plus, D 500, part no. 66417
- 2 Housing for touch control board for D 500plus, D 500, part no. 66416
- 3 Countersunk-head screw M3x16, part no. 103



Circuit board On/Off for D 500plus, D 500, part no. 68015

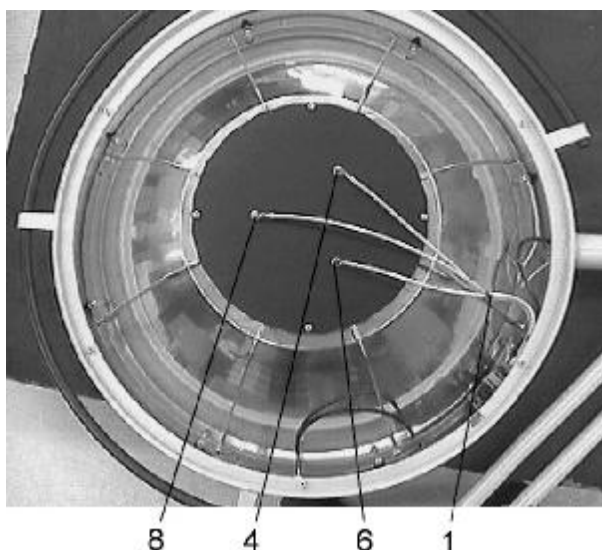
## 9. TEST AND ADJUSTMENT POINTS

### 9.1 Test points CHROMOPHARE® D 650

- TP 1** Terminal block 24 V D.C. loaded, tolerance + 1.5 / - 0.3 V
- TP 2** Sliding contact 24 V D.C. loaded, tolerance + 1.5 / - 0.3 V
- TP 3** Sliding ring 23.8 V D.C. loaded, tolerance + 1.5 / - 0.3 V
- TP 4** Sliding ring 23.6 V D.C. unloaded, tolerance + 1.5 / - 0.3 V
- TP 5** Cable connectors input X1/2 to X1/4 22.6 V A.C. / D.C., tolerance + 1.5 / - 0.3 V
- TP 6** Main bulb between cable 8 and 6 max. 22.0 V A.C. / D.C. RMS, tolerance + 0.3 V  
Setting of the max. bulb voltage see page 63 - 64, by means of adjustable resistor R 20

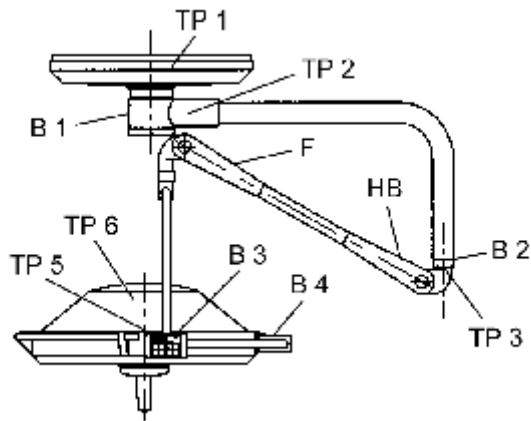
### 9.2 Test points CHROMOPHARE® D 650plus, D 530plus, D 500plus, D 530, D 500

- TP 1** Terminal block 24 V D.C. loaded, tolerance + 1.5 / - 0.3 V
- TP 2** Sliding contact 24 V D.C. loaded, tolerance + 1.5 / - 0.3 V
- TP 3** Sliding ring 23.8 V D.C. loaded, tolerance + 1.5 / - 0.3 V
- TP 4** Sliding ring 23.6 V D.C. unloaded, tolerance + 1.5 / - 0.3 V
- TP 5** Cable connectors input X1/2 to X1/4 23.3 V A.C. / D.C., tolerance + 1.5 / - 0.3 V
- TP 6** Main bulb between cable 8 and 6 max. 22.8 V A.C. / D.C. RMS, tolerance + 0.3 V  
Setting of the max. bulb voltage see page 63 - 64, by means of adjustable resistor R 20



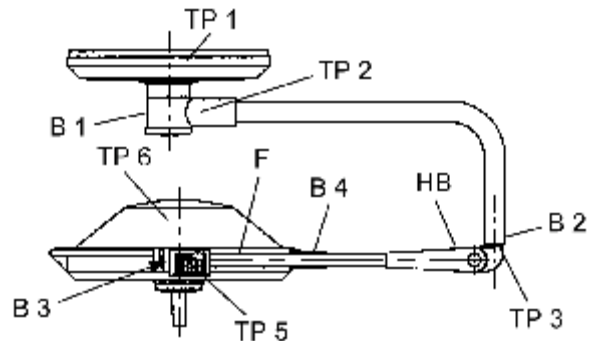
- 1** Wiring harness, from electronic to reflector connector, part no. 65769
- 6** Connection to main bulb, marked with 6
- 4** Connection to reserve bulb, marked with 4
- 8** Common connection to main and reserve bulb, marked with 8

### 9.3.1 CHROMOPHARE® D 650plus, D 650 (classic cardanic)



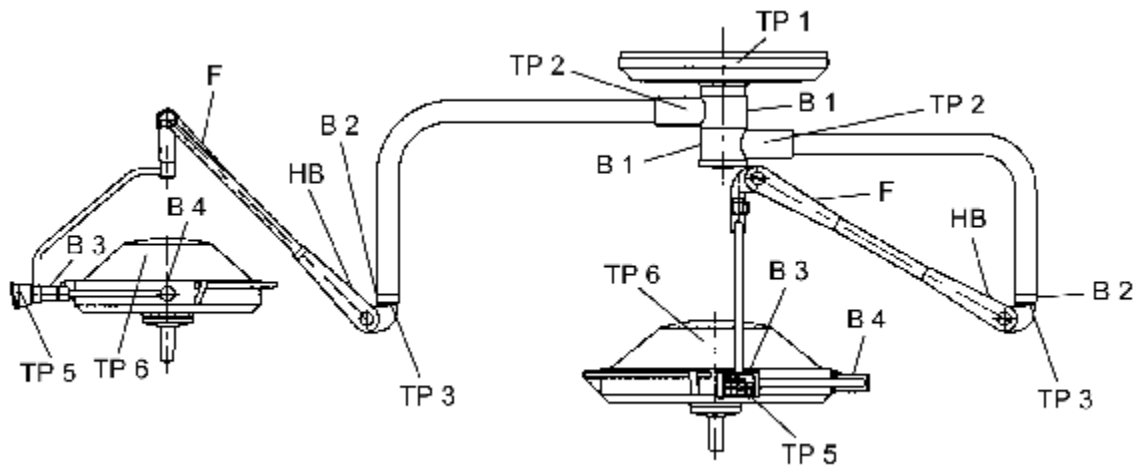
B Brake screw  
TP Test points, see page 59

### 9.3.2 CHROMOPHARE® D 650plus, D 650 (flat cardanic)



F Spring adjustment, see page 65 - 66  
HB Height movement, see page 66

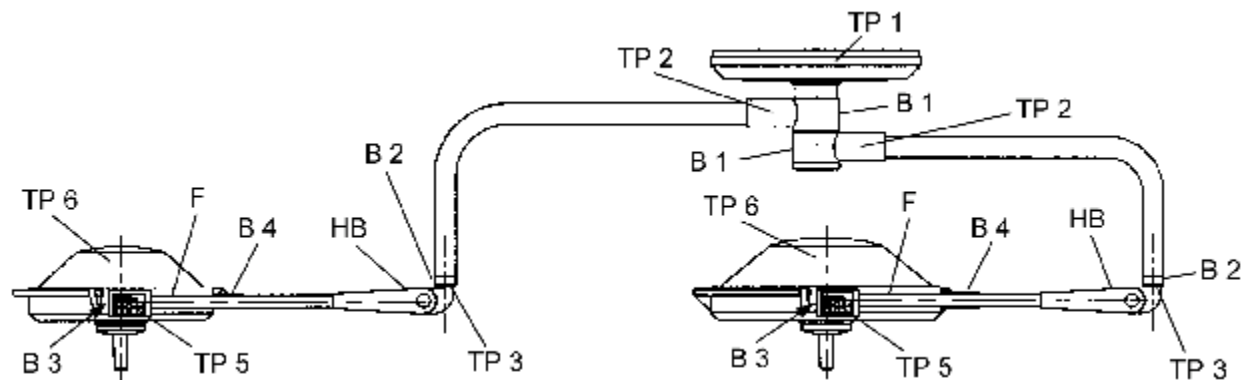
### 9.3.3 CHROMOPHARE® D 650plus/530plus, D 650/530 (classic cardanic)



B Brake screw  
TP Test points, see page 59

F Spring adjustment, see page 65 - 66  
HB Height movement, see page 66

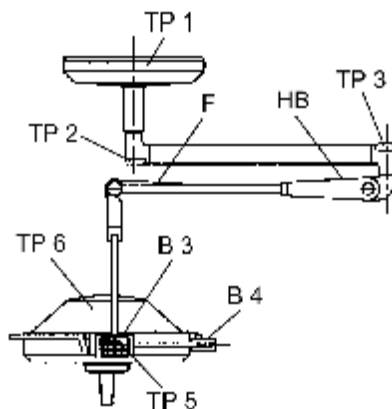
### 9.3.4 CHROMOPHARE® D 650plus/530plus, D 650/530 (flat Kardanik)



B Brake screw  
TP Test points, see page 59

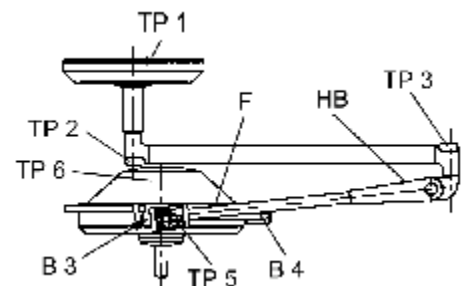
F Spring adjustment, see page 65 - 66  
HB Height movement, see page 66

### 9.3.5 CHROMOPHARE® D 530plus, D 530 (classic cardanic)



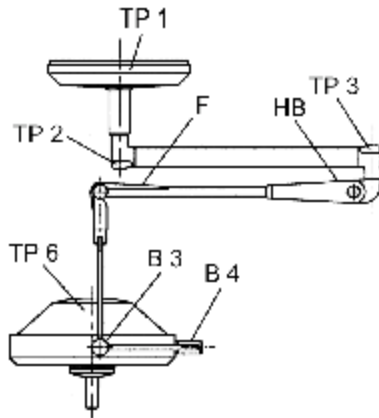
B Brake screw  
TP Test points, see page 59

### 9.3.6 CHROMOPHARE® D 530plus, D 530 (flat cardanic)



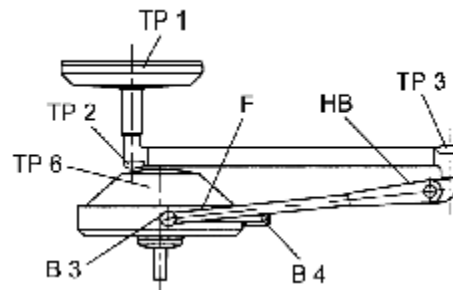
F Spring adjustment, see page 65 - 66  
HB Height movement, see page 66

### 9.3.7 CHROMOPHARE® D 500plus, D 500 (classic cardanic)



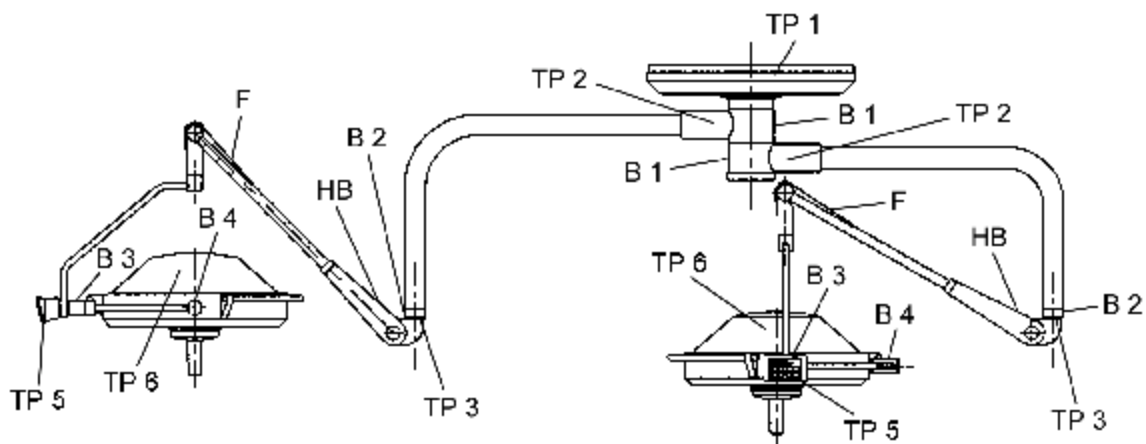
B Brake screw  
TP Test points, see page 59

### 9.3.8 CHROMOPHARE® D 500plus, D 500 (flat cardanic)



F Spring adjustment, see page 65 - 66  
HB Height movement, see page 66

### 9.3.9 CHROMOPHARE® D 530plus/530plus, D 530/530 (classic cardanic)



B Brake screw  
TP Test points, see page 59

F Spring adjustment, see page 65 - 66  
HB Height movement, see page 66



**Attention:**

For correct bulb voltage setting please notice!

If the light intensity power circuit board is installed in separate wall box please take also the voltage drop of the cable into consideration.

If the terminal voltage under load on the ceiling tube is higher than 24.5 V D.C. (main or supplementary supply), an electronically alignment must be done. The reason for this is an exceeding of the allowed halogen lamp tension (set-point 22.0 V +/- 0.2 V A.C./D.C.) because of the electronically aligned terminal voltage of 24.0 V. Changes of the terminal voltage are not controlled and therefore affect the halogen lamp tension (life time, illumination).

If the terminal voltage under load on the ceiling tube is higher than 2.0 V D.C., the halogen lamp tension cannot be aligned to the maximum allowed set-point.

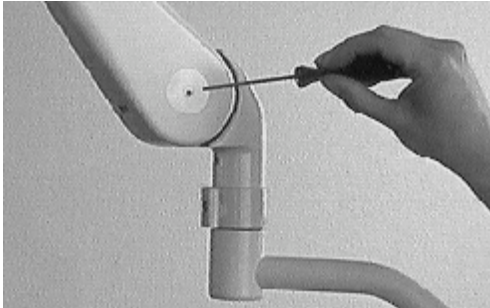
The electronically alignment has first to be effected with emergency supply (D.C.). In this way, changes in the illumination can be excluded. After having aligned, the main supply must be adjusted accordingly via transformer taps.

**How to proceed the D.C. alignment:**

1. Switch on the emergency supply.
2. Switch on the light.
3. Measuring of the terminal voltage on the ceiling terminal (set-point 24.0 V D.C. under load).
4. Terminal voltage = 24.0 V D.C. (+0.3 V tolerance): no electronic alignment is necessary.
5. Terminal voltage > 24.3 V D.C.: adjusting of the halogen lamp tension to 22.2 V A.C./D.C. (+0.3 V tolerance) on the measuring point „reflector connection“ on the back of the key board through adjustable resistor R 20 (see page 65, the original boards are without component printing). As another measuring point, the terminals of the power board X 1/2 and X 1/4 (part no. 65604) can be used. The alignment value through adjustable resistor R 20 on this measuring points amounts to 22.6 V A.C./D.C. (+0.3 V tolerance). Because of the voltage drop, the halogen lamp tension amounts to 22.0 V A.C./D.C. (+0.3 V tolerance) at D 650 and 22.8 V A.C./D.C. (+0.3 V tolerance) at D 650plus, D 530plus, D 530.
6. End of alignment respectively beginning of the transformer adjustment, see page 36.

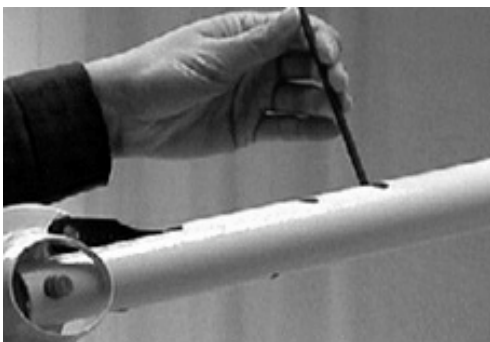
## 10. ADJUSTMENT OF WEIGHT COMPENSATION ON THE SPRING ARM

### 10.1 CHROMOPHARE® D 650plus, D 650 (classic cardanic)



Remove both screws by using a 2 mm Allen key.

Loosen the covers of the spring-balanced support arm.



#### Adjustment:

##### Light head drifts upward:

Move the acrobat arm upward or downward as far as the circular nut becomes visible in one of the two windows. Turn this circular nut with a steel pin, diameter 4 mm, in the direction of the minus symbol.

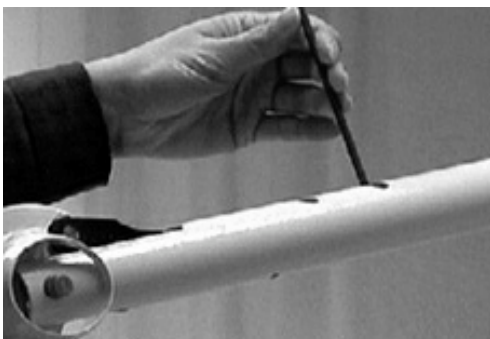
##### Light head moves downward:

Turn the circular nut in the direction of the plus symbol.

### 10.2 CHROMOPHARE® D 530plus, D 500plus, D 530, D 500 (classic cardanic)



By pulling the round side caps slightly apart the main covering hull can be lifted off of the spring arm.



#### Adjustment:

##### Light head drifts upward:

Move the acrobat arm upward or downward as far as the circular nut becomes visible in one of the two windows. Turn this circular nut with a steel pin, diameter 4 mm, in the direction of the minus symbol.

##### Light head moves downward:

Turn the circular nut in the direction of the plus symbol.

### 10.3 CHROMOPHARE® D 650plus, D 530plus, D 500plus, D 650, D 530, D 500 (flat cardanic)



Remove the cover plate by using a Phillips screwdriver.



#### Adjustment:

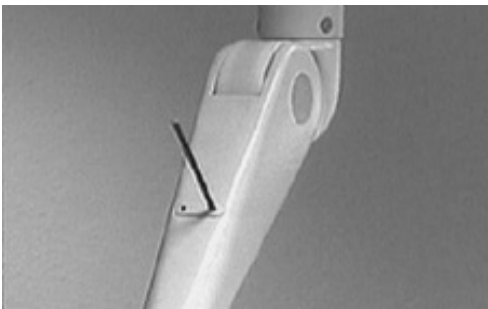
##### **Light head drifts upward:**

Move the acrobat arm upward or downward as far as the circular nut becomes visible in one of the two windows. Turn this circular nut with a steel pin, diameter 4 mm, in the direction of the minus symbol.

##### **Light head moves downward:**

Turn the circular nut in the direction of the plus symbol.

## 11. ADJUSTMENT OF HEIGHT MOVEMENT ON THE SPRING ARM



The spring arm can be adjusted to a horizontal position on a low ceiling.

Remove the cap.



Adjust the arm until the round nut in the groove becomes visible. Turn to the desired adjustment with a 4 mm dia. steel pin.

## 12. BRAKE ADJUSTMENTS

Tools required:  
Slotted screwdriver, large  
Allen key 3 mm  
Allen key 2,5 mm

The braking effect of the individual joints must be adjusted so that the lamp housing remains in the required position. If a suspension arm of the OP light drifts away, the appropriate brake screw must be tightened.



The mobility of the swivel arm can be adjusted with the brake screw (slotted screw).

+ ⌚ Clockwise  
– ⌚ Anti-clockwise



The mobility of the swivel arm can be adjusted with the brake screw (slotted screw).

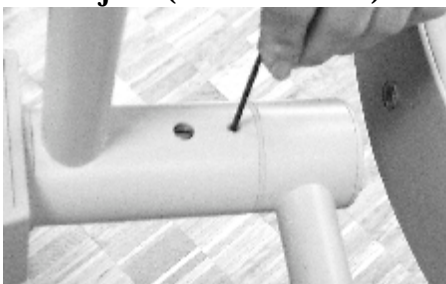
+ ⌚ Clockwise  
– ⌚ Anti-clockwise



The mobility of the light head can be adjusted with the brake screw.  
(Allen key 3 mm)

+ ⌚ Clockwise  
– ⌚ Anti-clockwise

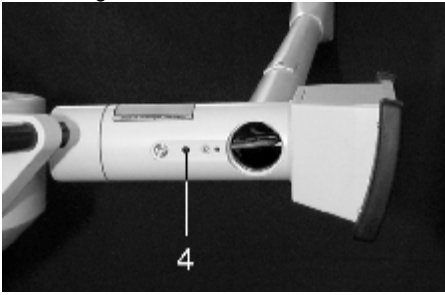
### Cardan joint (classic cardanic)



The mobility of the cardan joint can be adjusted with the brake screw.  
(Allen key 3 mm)

+ ⌚ Clockwise  
– ⌚ Anti-clockwise

### Cardan joint (flat cardanic)



The mobility of the cardan joint can be adjusted with the brake screw.  
(Allen key 2.5 mm)

- + ⚙ Clockwise
- ⚙ Anti-clockwise

**Attention:**

- + ⚙ increase friction
- ⚙ decrease friction

### 13. MAINTENANCE PROGRAM

CHROMOPHARE® light .....	Serial no. ....		
	i.O.*	n.i.O.*	Eliminated
Check lamp on/off switch.			
Check maximum intensity of illumination at a distance of 1 m with small luminous field.			
Check maximum voltage of the bulb			
Adjustment of luminosity i.e. degrees of luminosity			
Lamp body: check that the hood support screws are properly tightened			
Lamp body: check the condition of the cable comb			
Commutation of the reserve bulbs			
Focussing system			
Check the Autobloc System / hand-rail tube (in the C 950/C952 models only)			
Check the Autobloc System / hand-rail tube (in the C 950/C952 models only)			
Diameter of the luminous body			
System for following the luminous field			
Brakes (clutch-type brakes)			
Tension of the support arm springs			
Support screws of the central positioning shaft / tighten the ceiling tube (min 23 Nm)			
Check the means of illumination i.e. the original BERCHTOLD halogen bulb (Voltage, Watts)			
Check the contacts of the bulb supports			
Check the power feed cables of the bulb supports			
Check the reflectors of the halogen bulbs			
Check the glass filter shields			
Check the collector ring and the strip contacts			
Align the flanged tube			
Eliminate or cover scratches and damage to the paintwork			
Check the closing mechanism of the replacement holders			
Rubber seals			
Measure the resistance of the security conductor (compliance with VDE standards)			
Check commutation to emergency current			
<i>In Chromo Vision lamps:</i>			
Check the CCD stop systems (only for the video camera with the 16-pole cable)			
Check the 16-pole video camera cable with the specific equipment designed for this purpose			
Unify the colour definition schemes in the video camera and the monitor			

Edition 10/98 (replaces all previous editions)

\* i.O. = has been ordered      n.i.O. = not ordered

.....  
Date / Signature (Installation technician)

.....  
Date / Signature (Collaborator – Hospital)

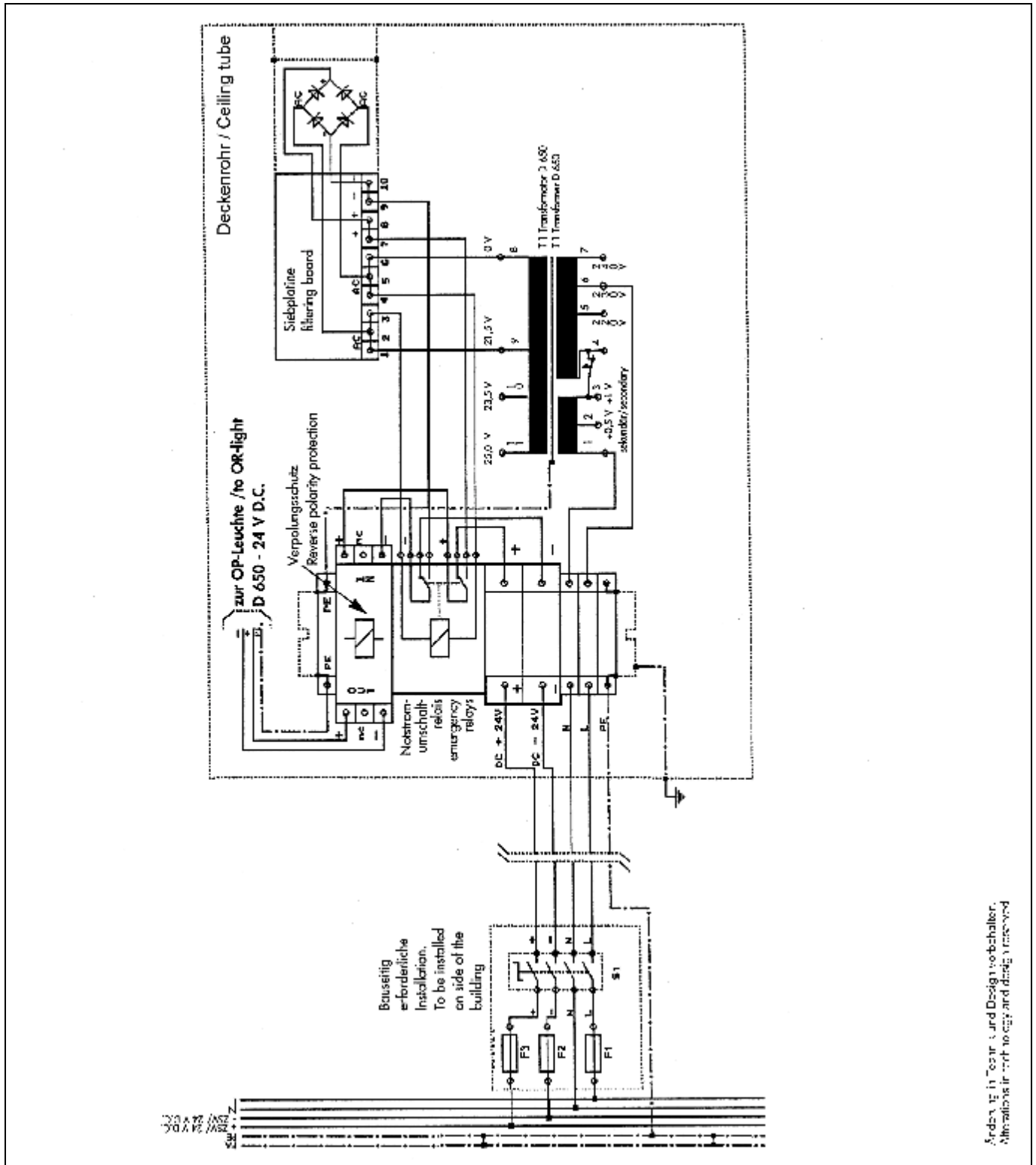


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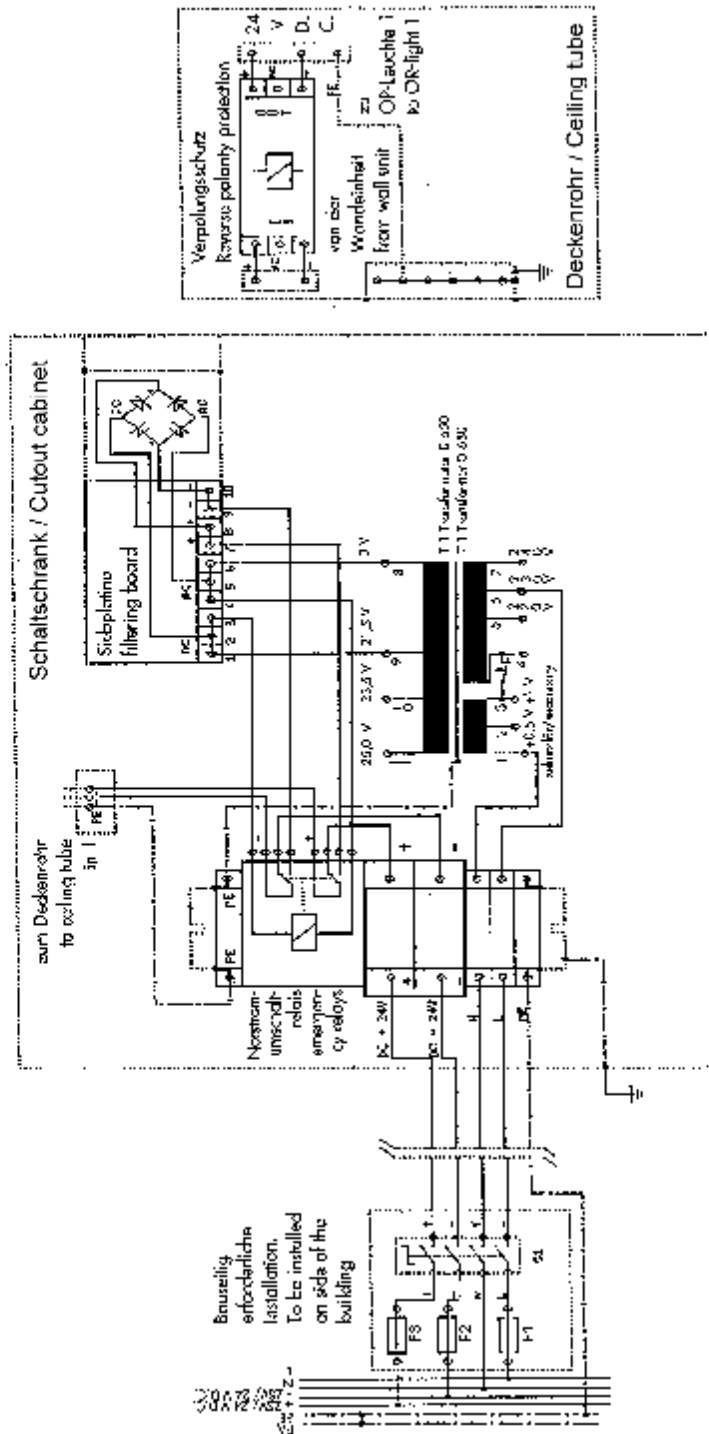
## 14.2 CHROMOPHARE® D 650plus, D 650

Transformer and emergency relays mounted on the ceiling tube



Seiten 15 in "Design und Designvorhaben".  
Abbildungen in "Design und Designvorhaben".

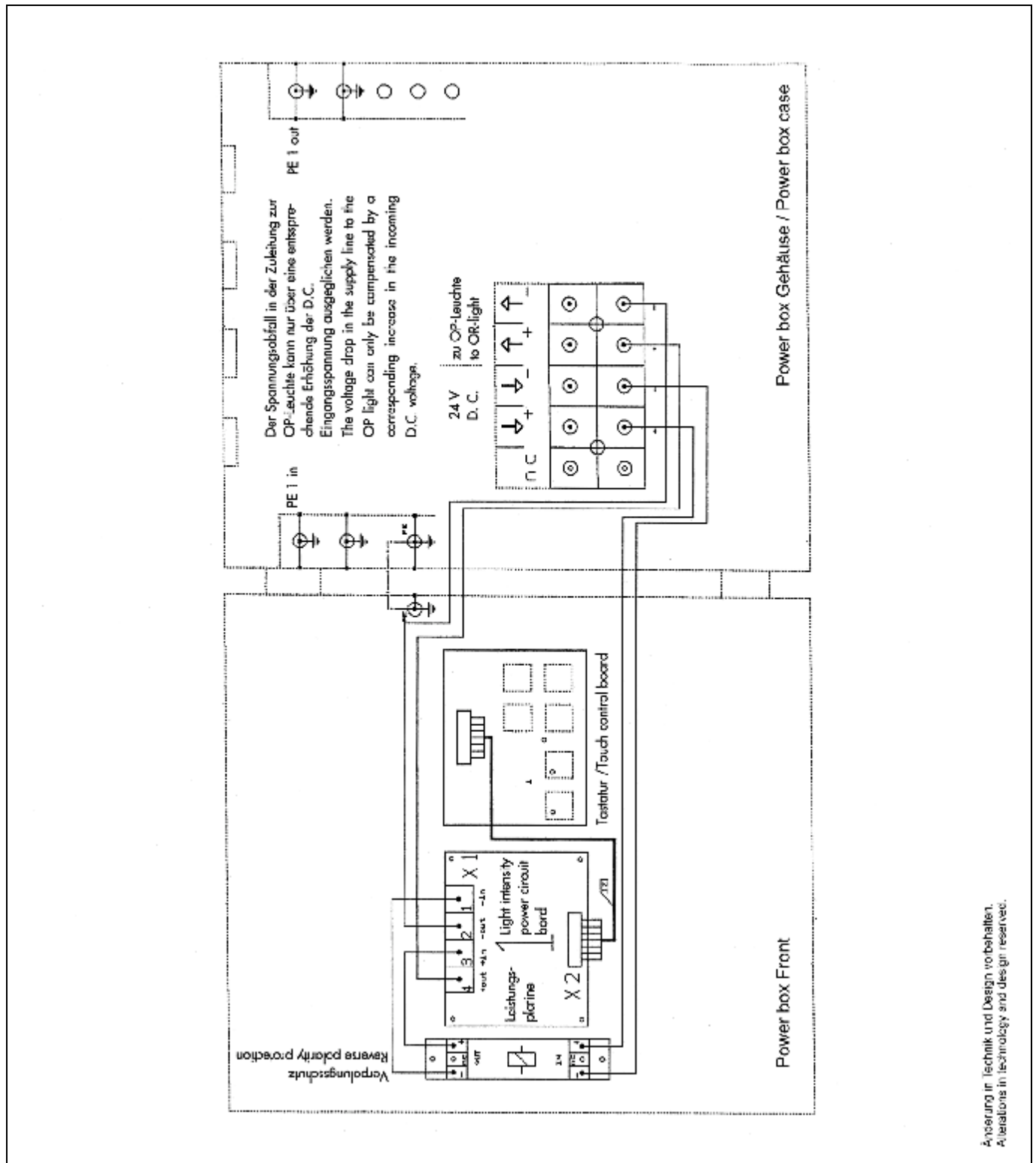
### 14.3 CHROMOPHARE® D 650plus, D 650 Power supply mounted in a cut-out cabinet



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#### 14.4 CHROMOPHARE® D 650plus, D 650

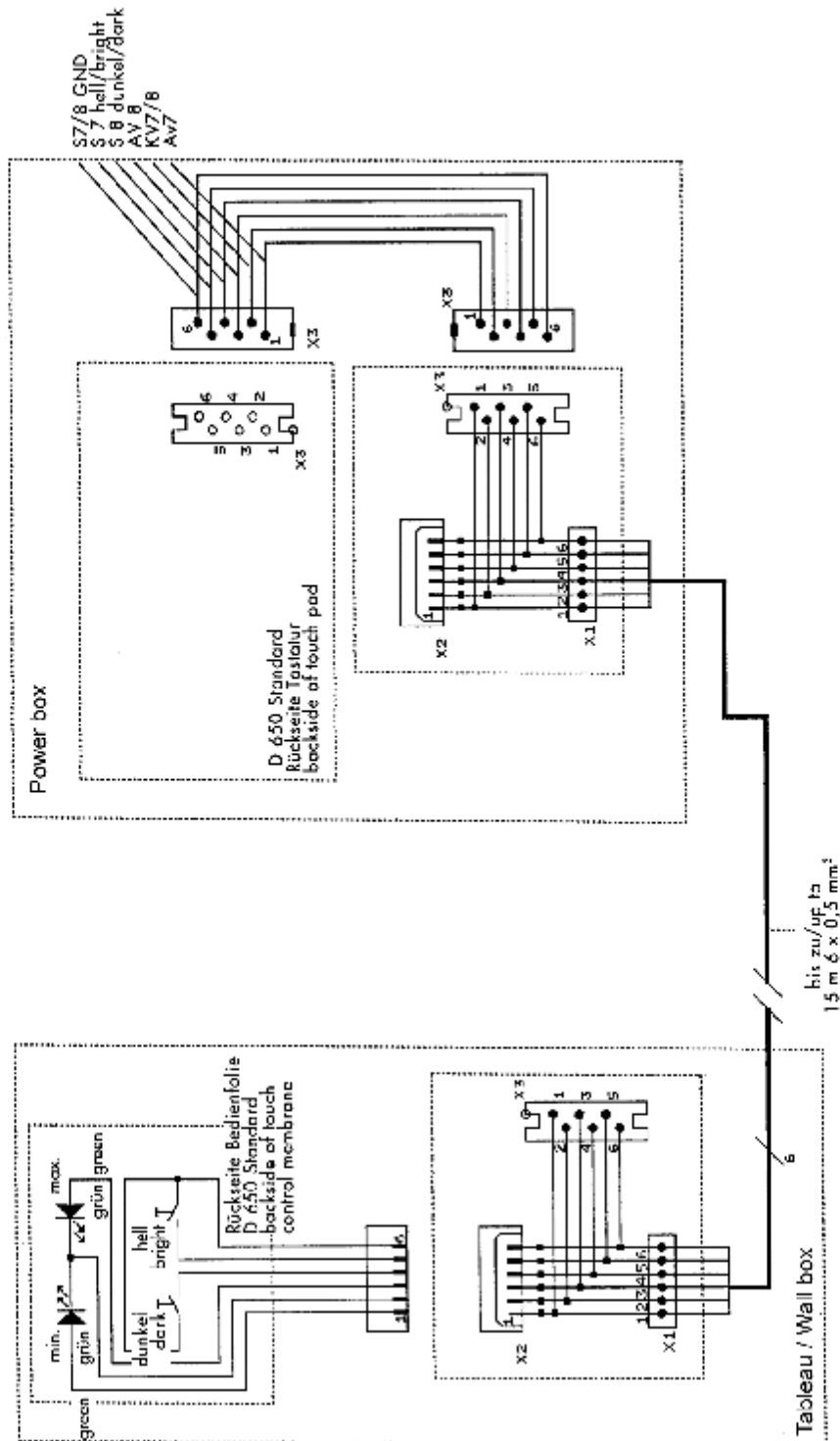
Control unit in "Power box" mounted separately from the OR-Light



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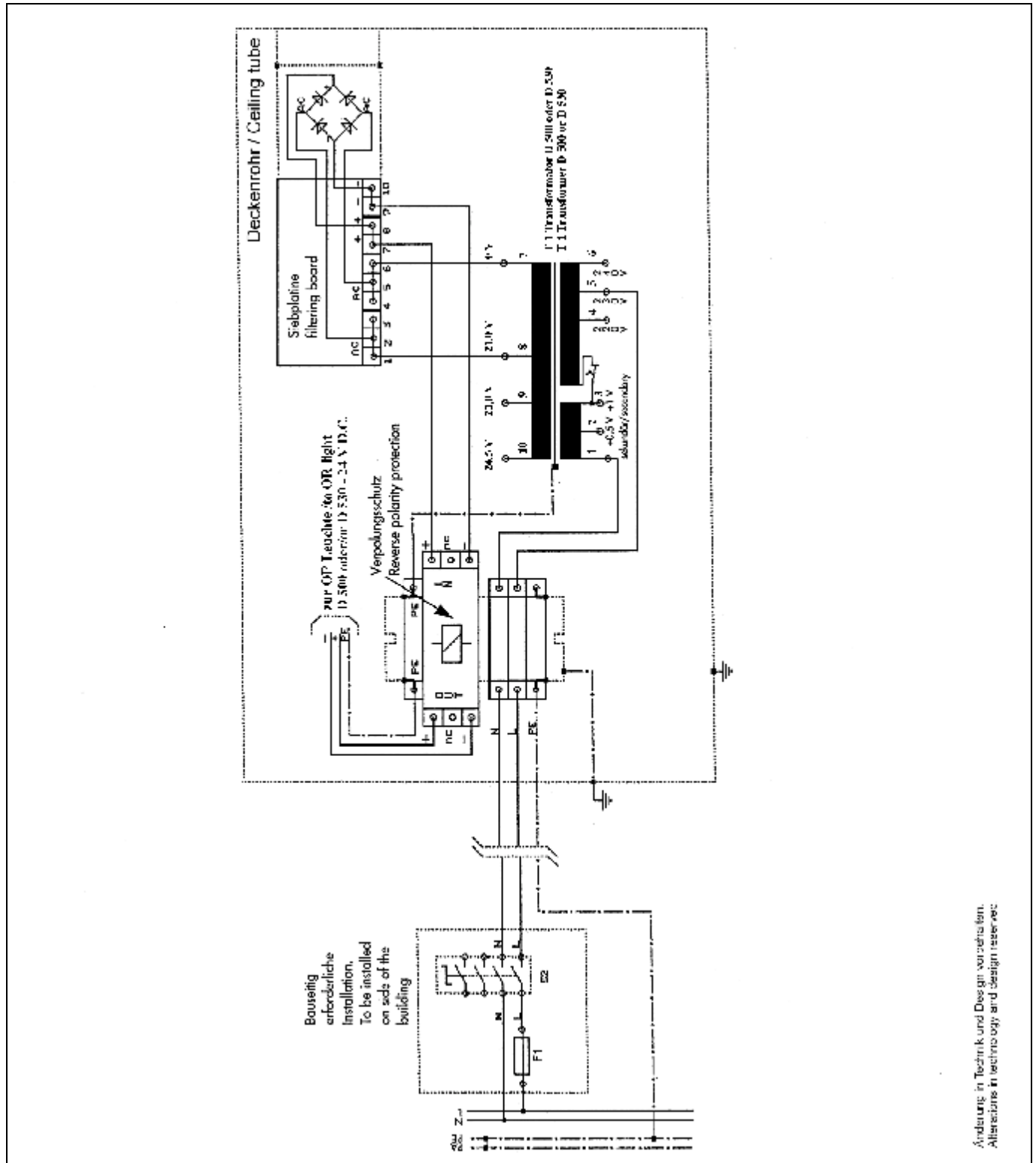
## 14.5 CHROMOPHARE® D 650plus, D 650

Touch panel for light intensity is mounted in the wall panel



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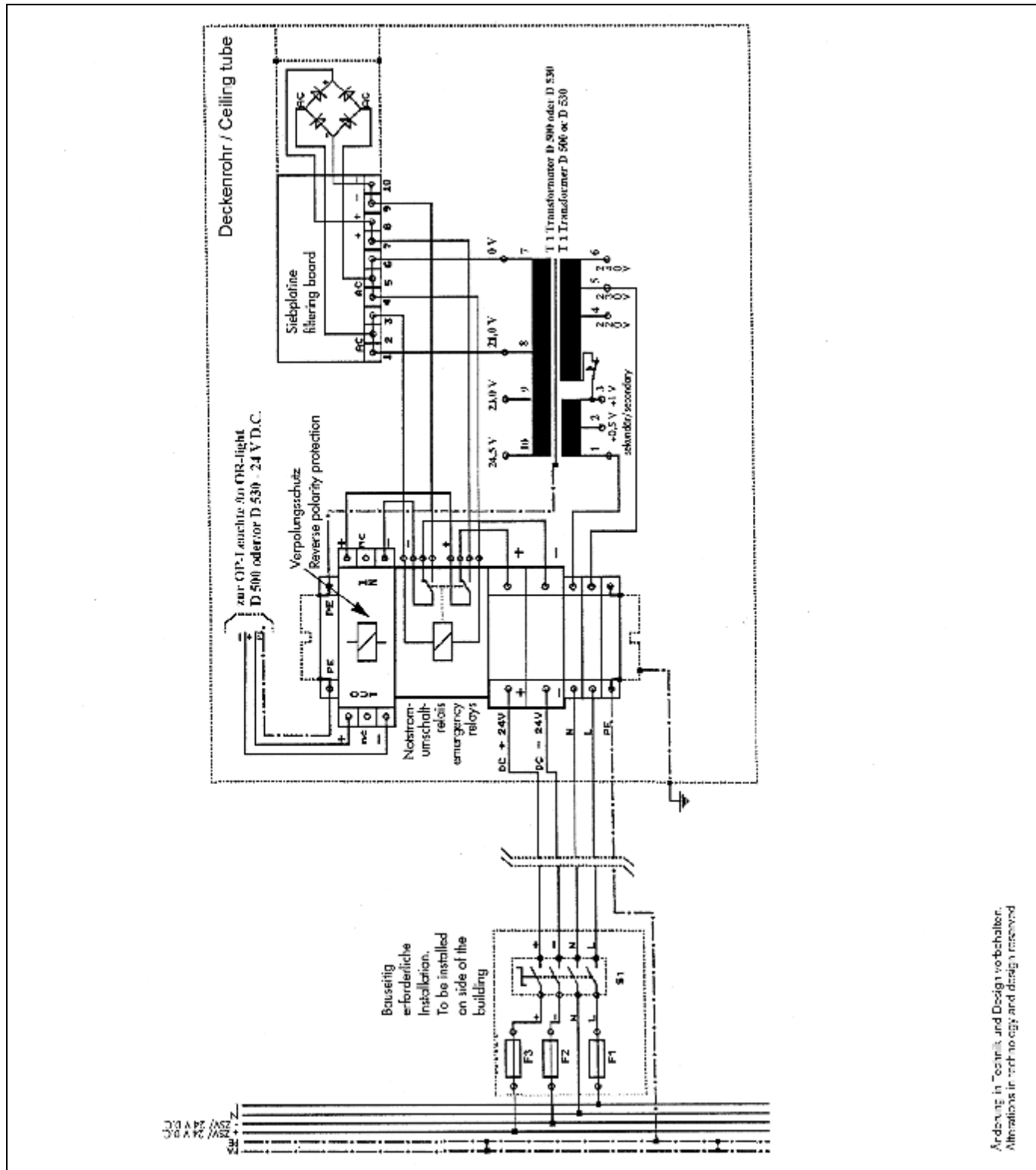
# 14.6 CHROMOPHARE® D 530plus, D 500plus, D 530, D 500 Transformer mounted on the ceiling tube



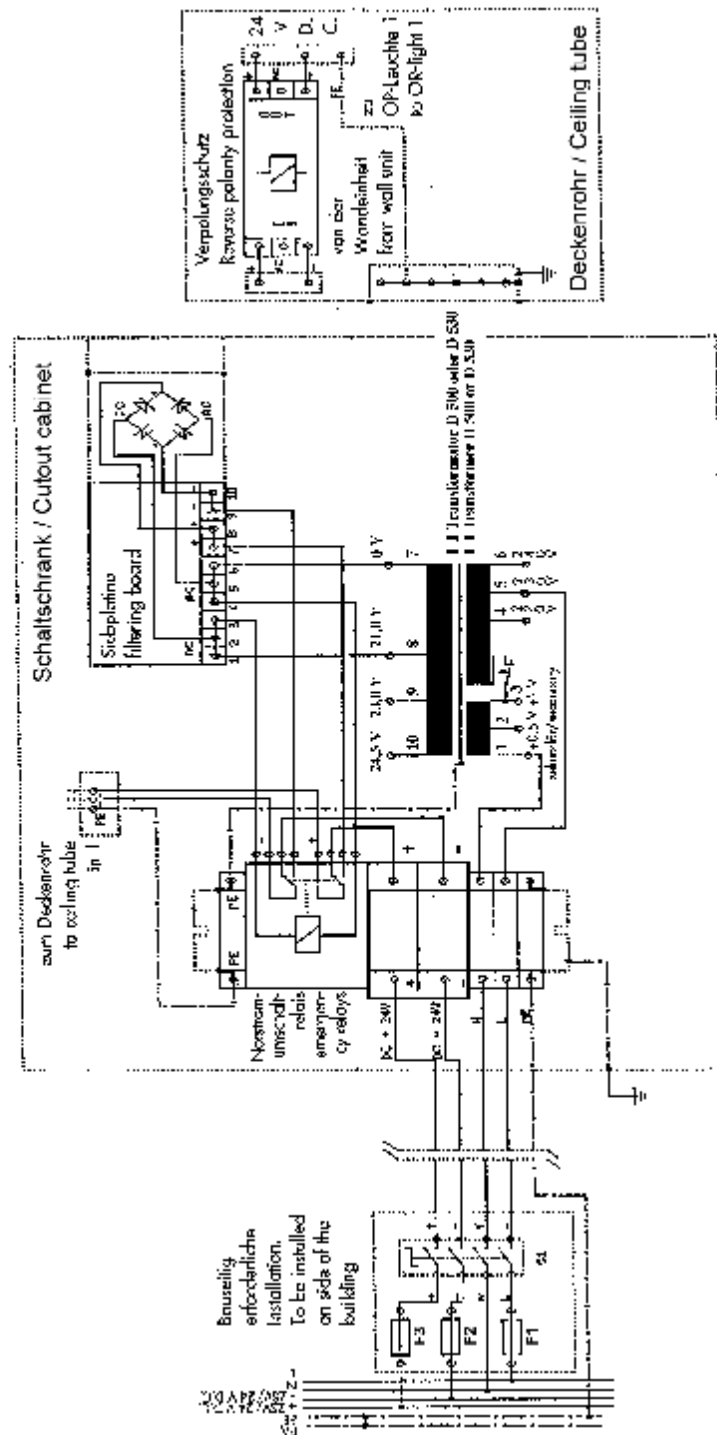
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## 14.7 CHROMOPHARE® D 530plus, D 500plus, D 530, D 500

Transformer and emergency relays mounted on the ceiling tube

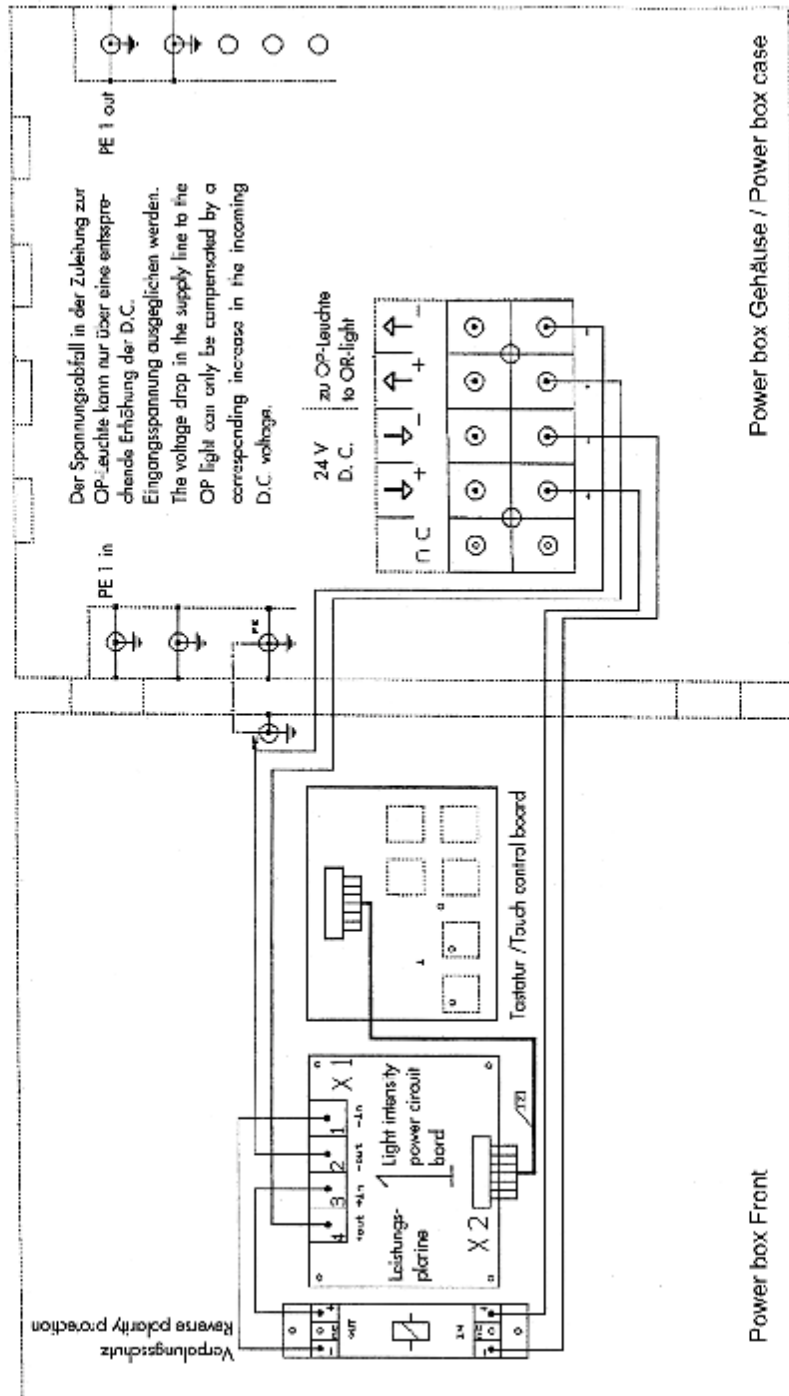


# 14.8 CHROMOPHARE® D 530plus, D 500plus, D 530, D 500 Power supply mounted in a cut-out cabinet



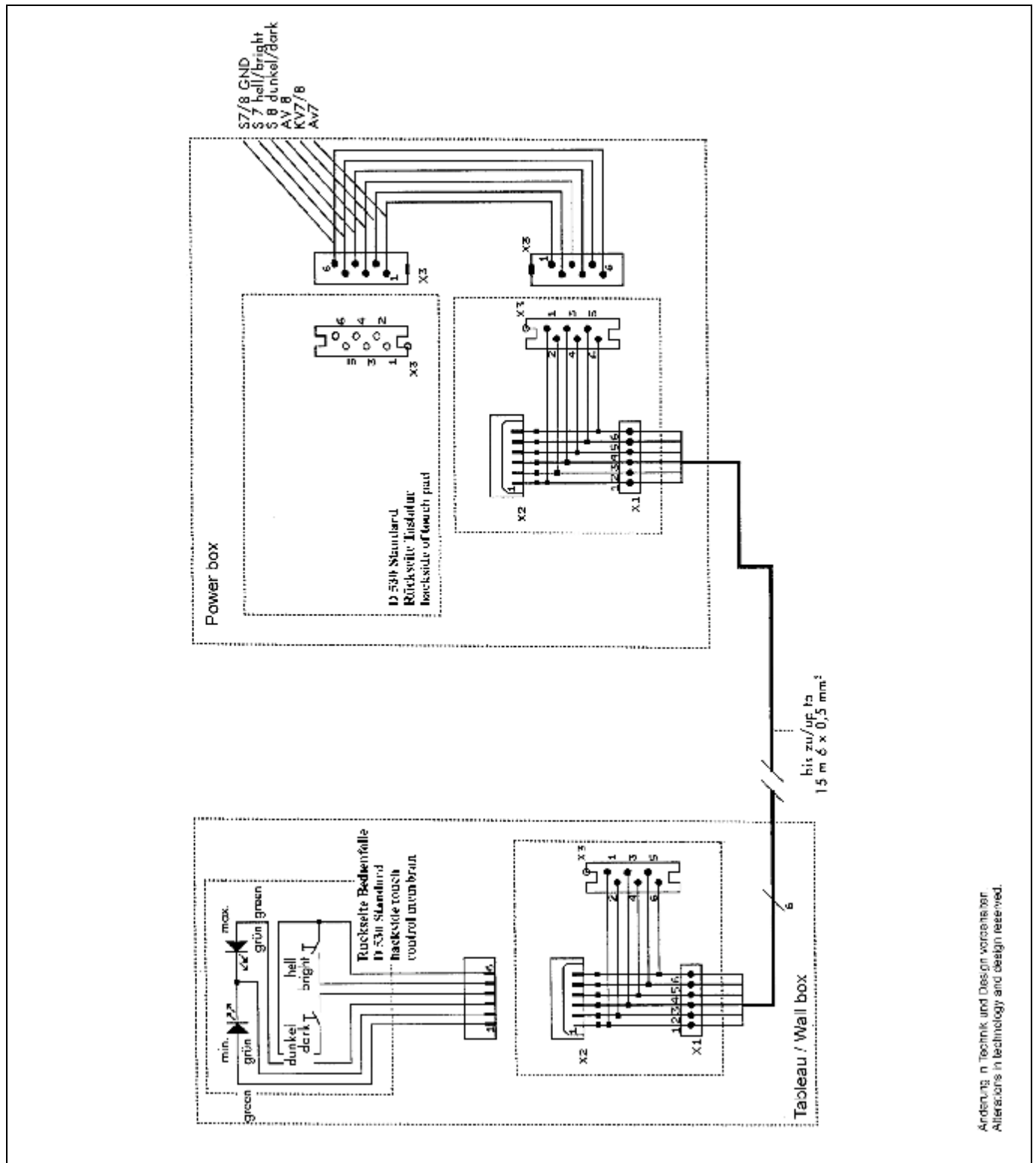
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# 14.9 CHROMOPHARE® D 530plus, D 500plus, D 530, D 500 Control unit in "Power Box" mounted separately from the OR-Light



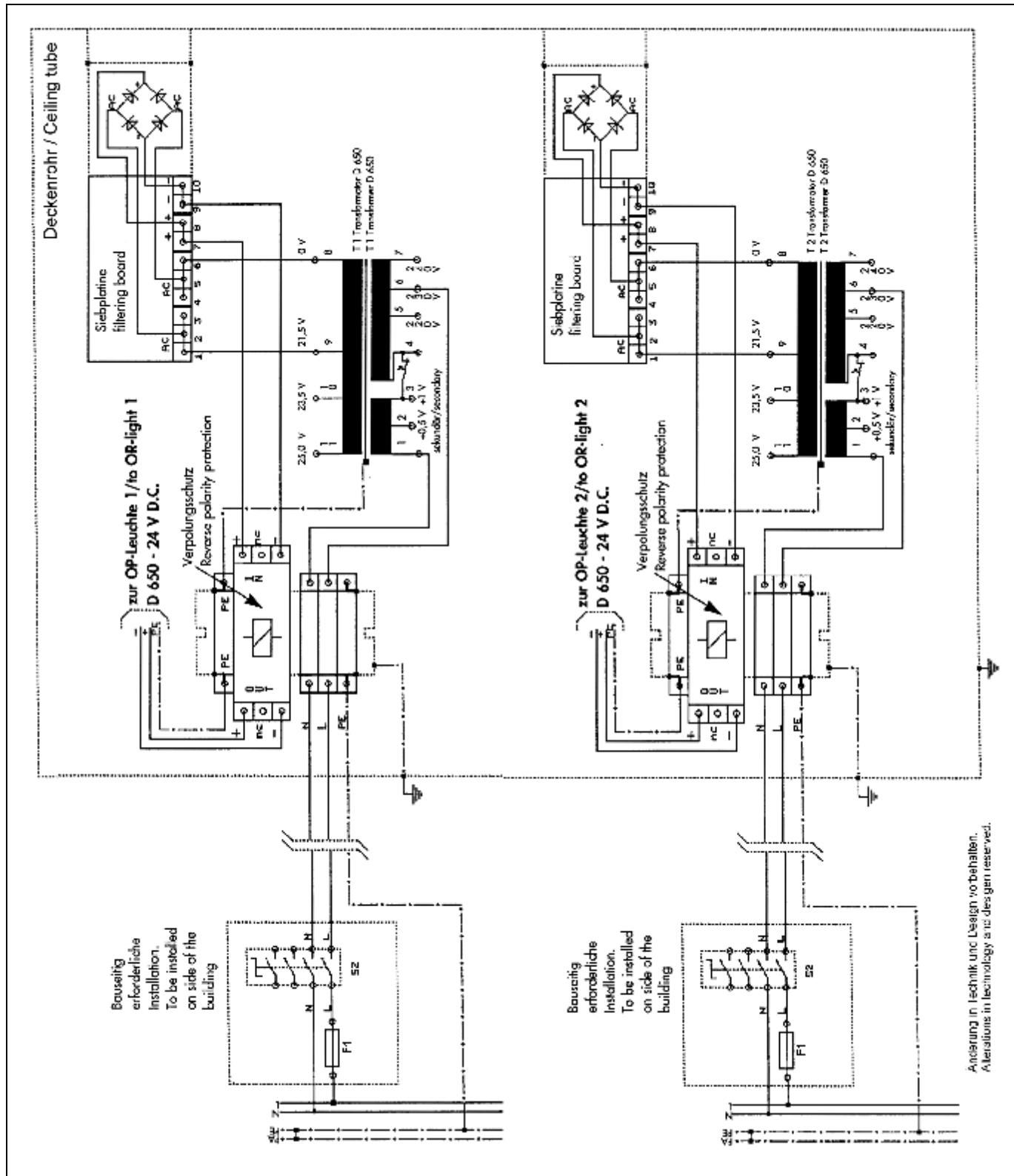
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# 14.10 CHROMOPHARE® D 530plus, D 500plus, D 530, D 500 Touch panel for light intensity is mounted in the wall panel



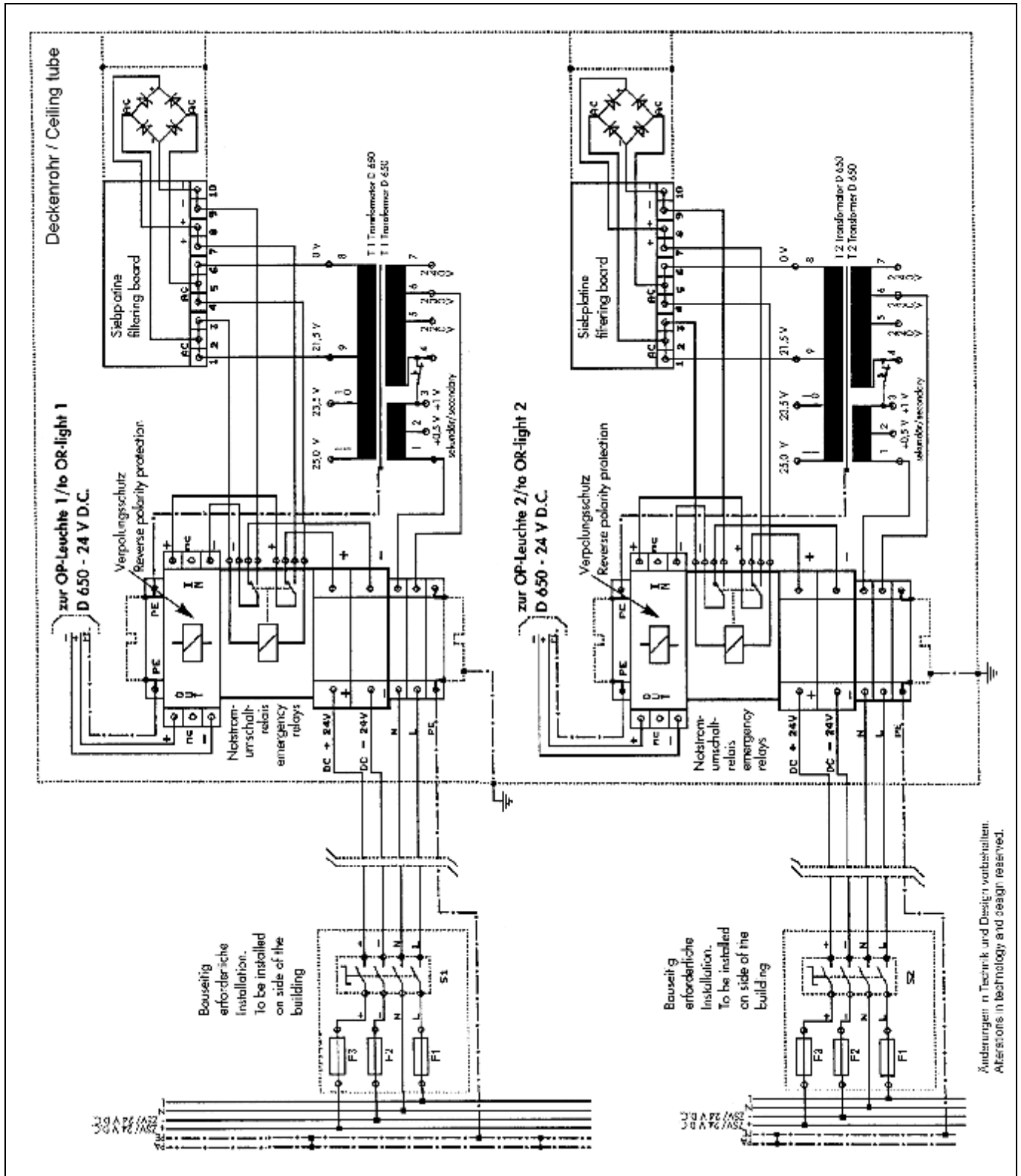
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# 14.11 CHROMOPHARE® D 650plus/650plus, D 650/650 Transformers mounted on the ceiling tube

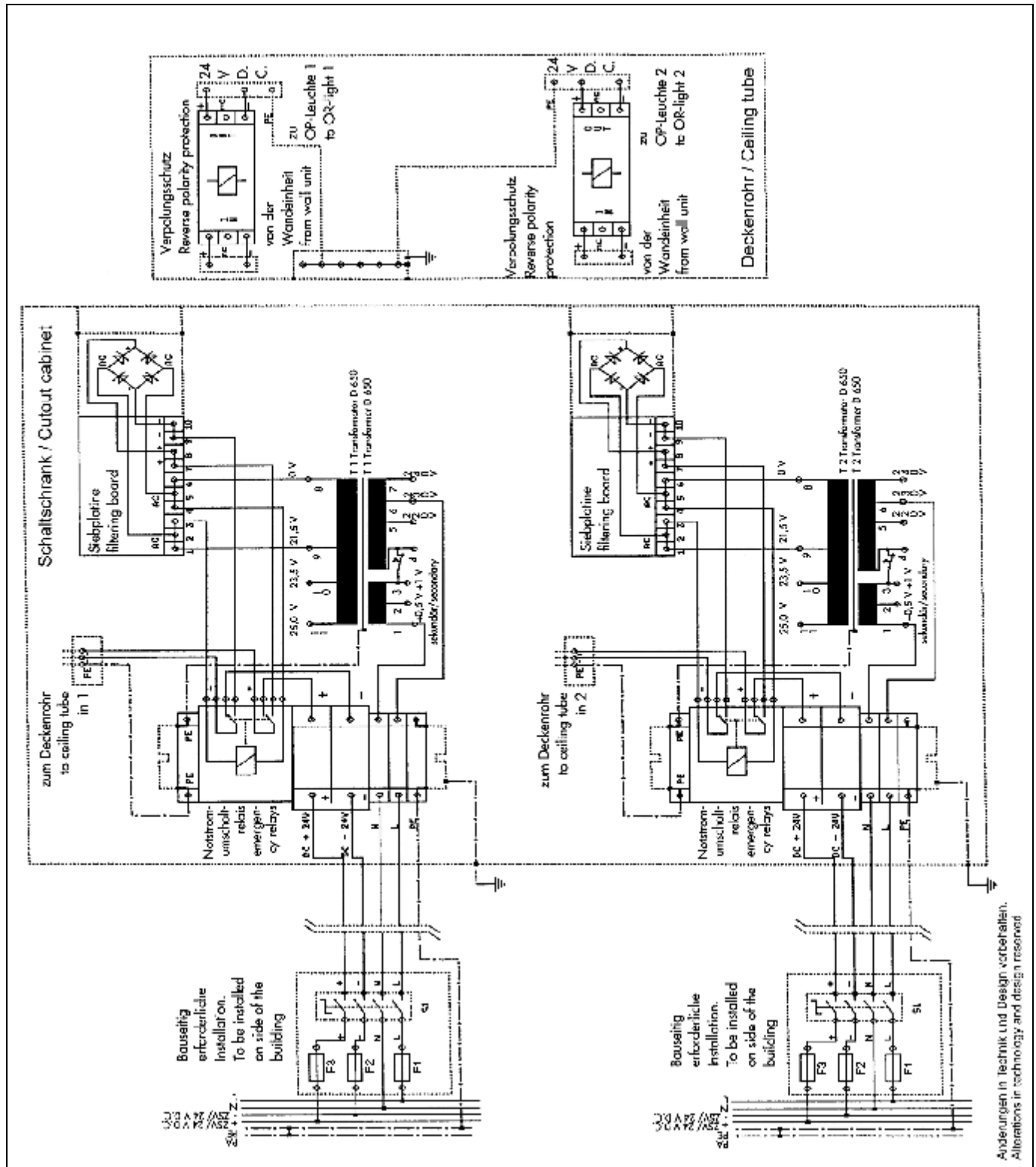


## 14.12 CHROMOPHARE® D 650plus/650plus, D 650/650

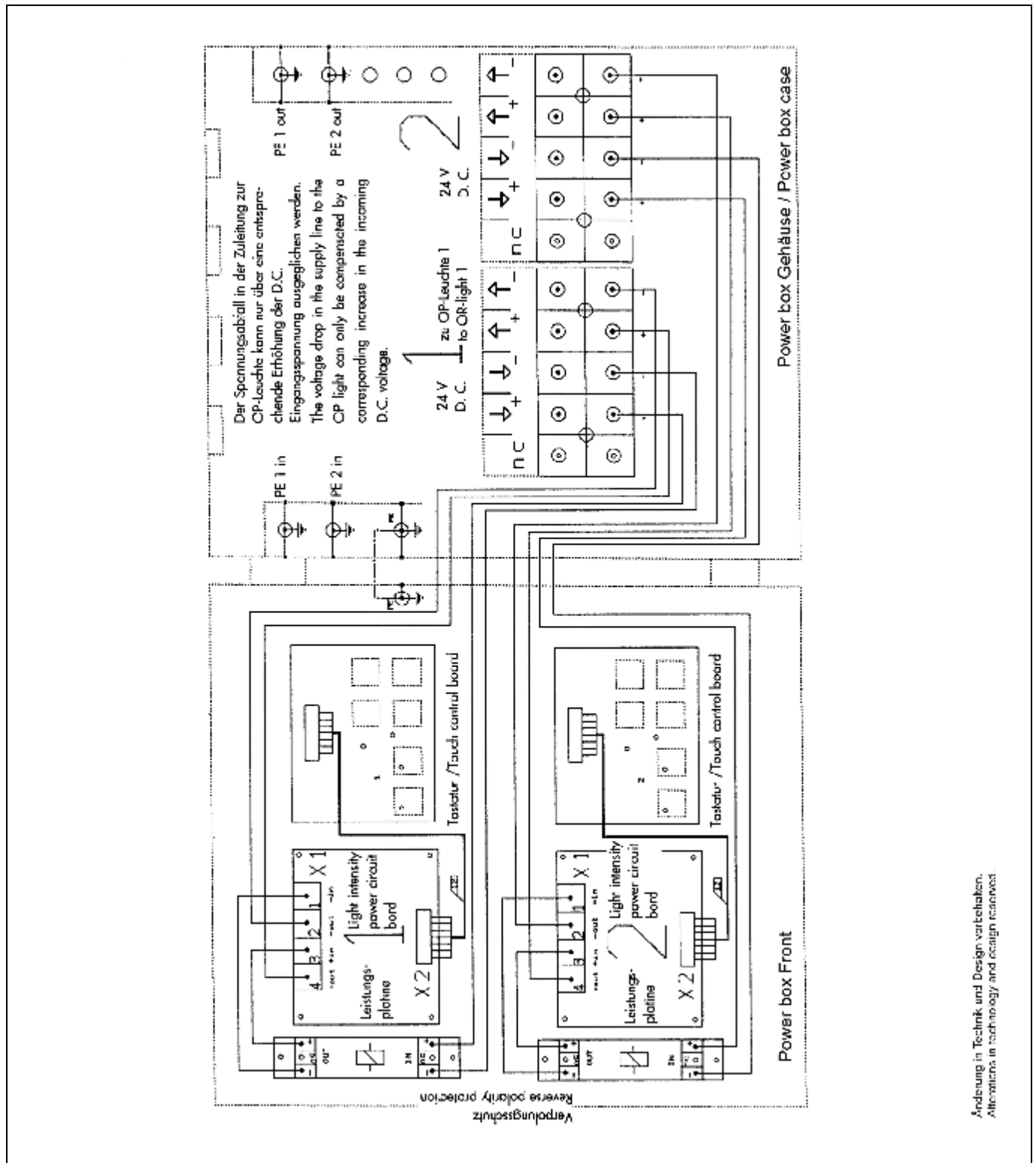
Transformers and emergency relays mounted on the ceiling tube



# 14.13 CHROMOPHARE® D 650plus/650plus, D 650/650 Power supply mounted in a cut-out cabinet



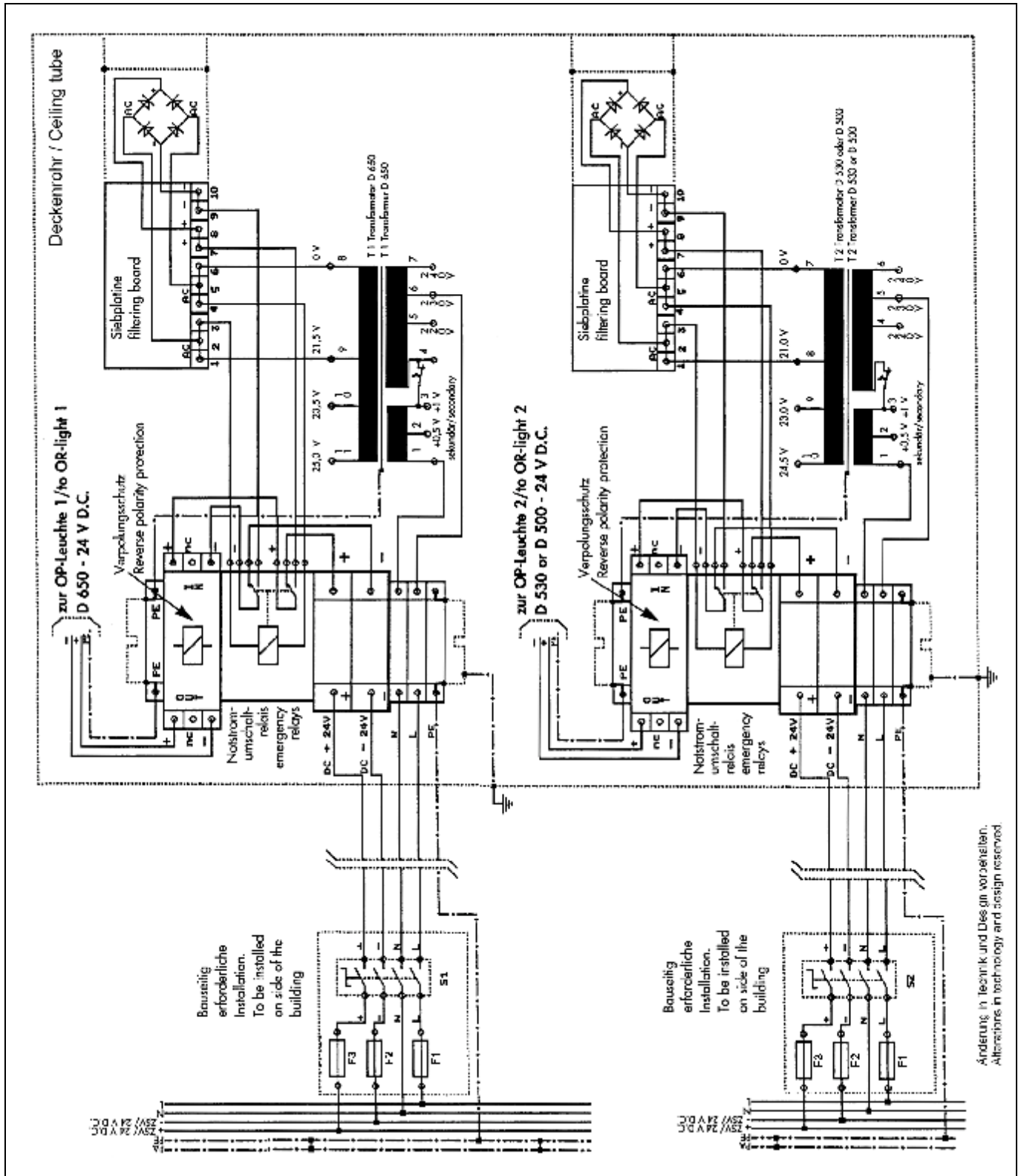
# 14.14 CHROMOPHARE® D 650plus/650plus, D 650/650 Control units in "Power Box" mounted separately from the OR-Light



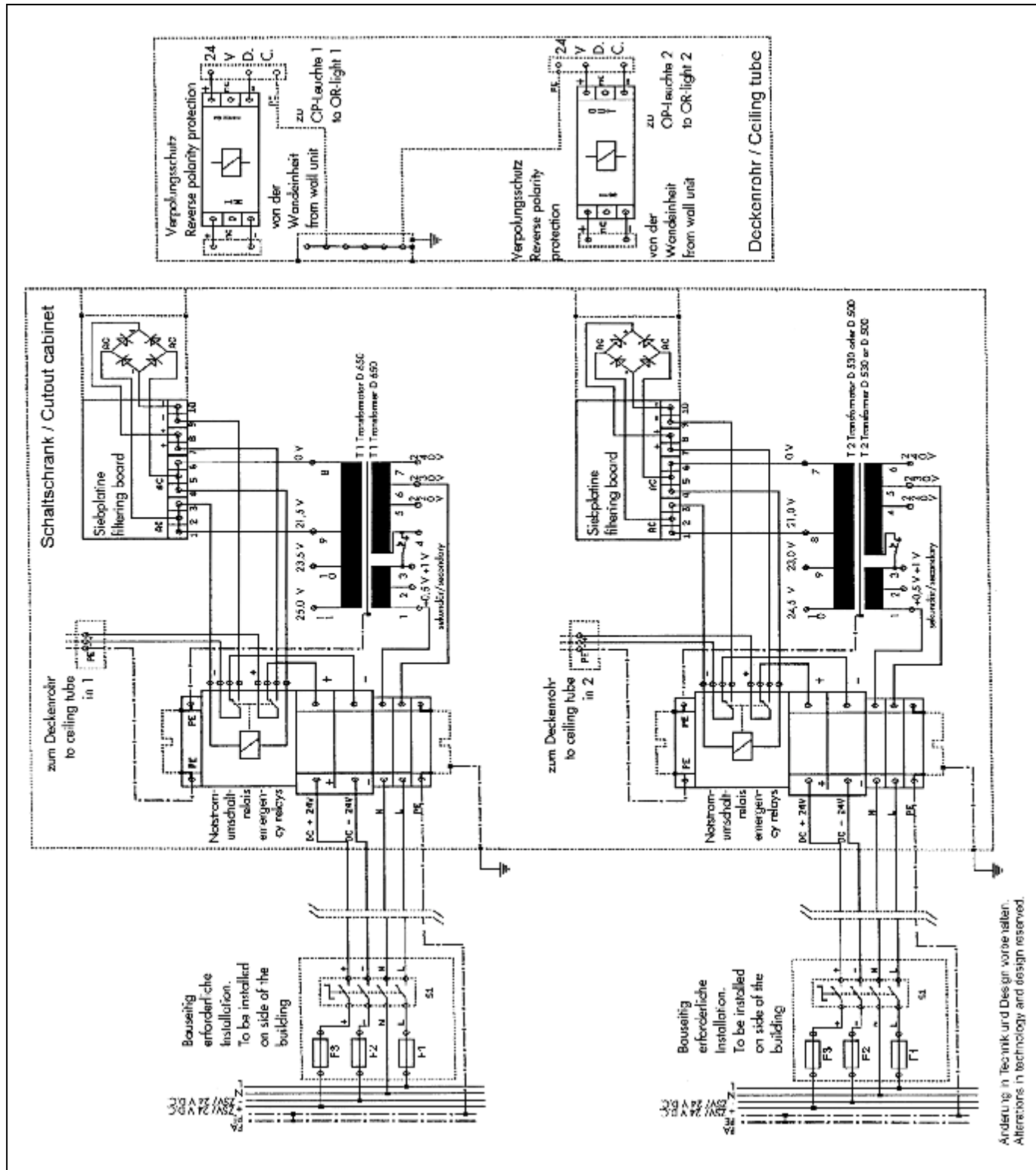
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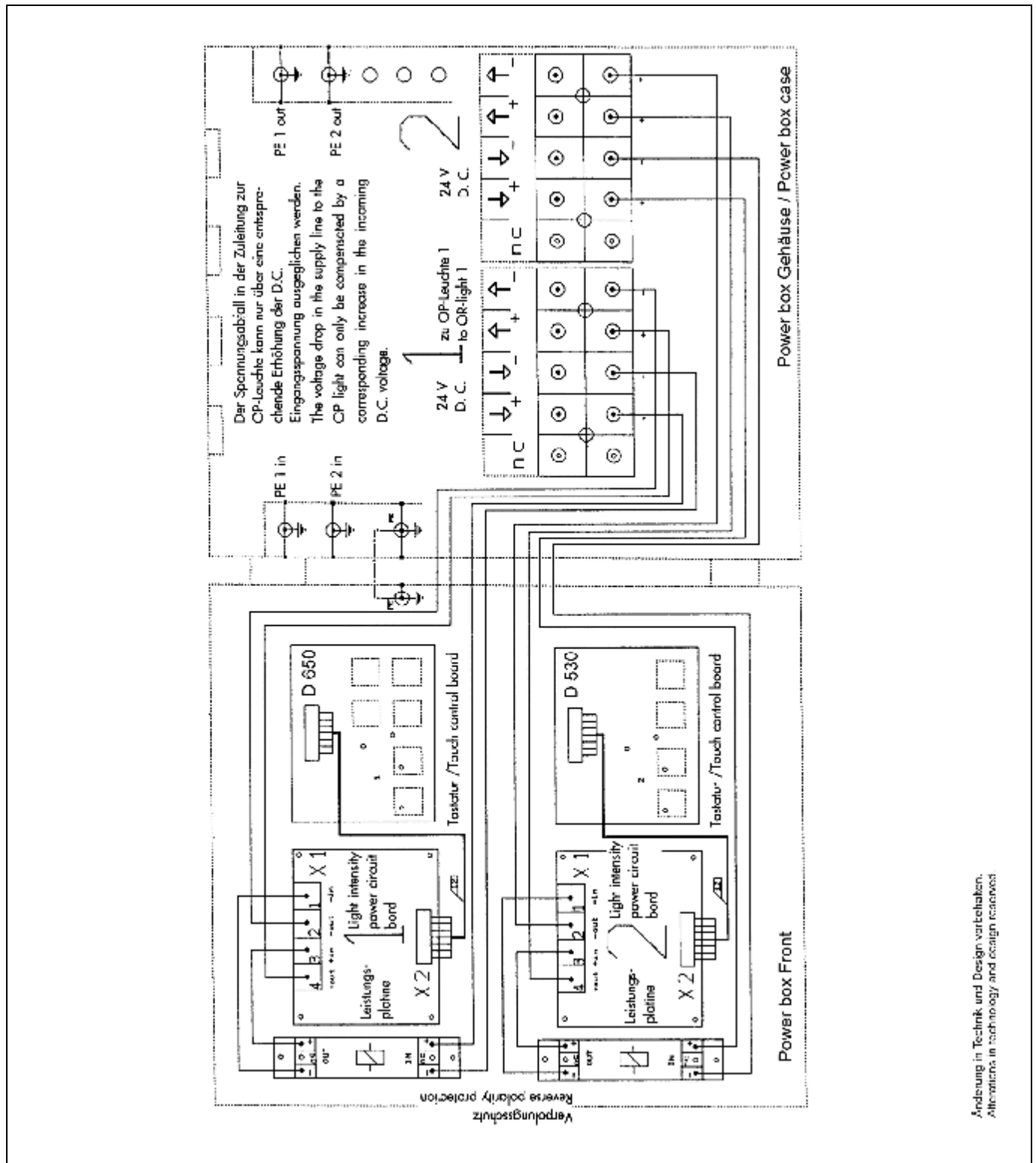
# 14.16 CHROMOPHARE® D 650plus/530plus, D 650plus/500plus, D 650/530, D 650/500 Transformers and emergency relays mounted on the ceiling tube



# 14.17 CHROMOPHARE® D 650plus/530plus, D 650plus/500plus, D 650/530, D 650/500 Power supply mounted in a cut-out cabinet



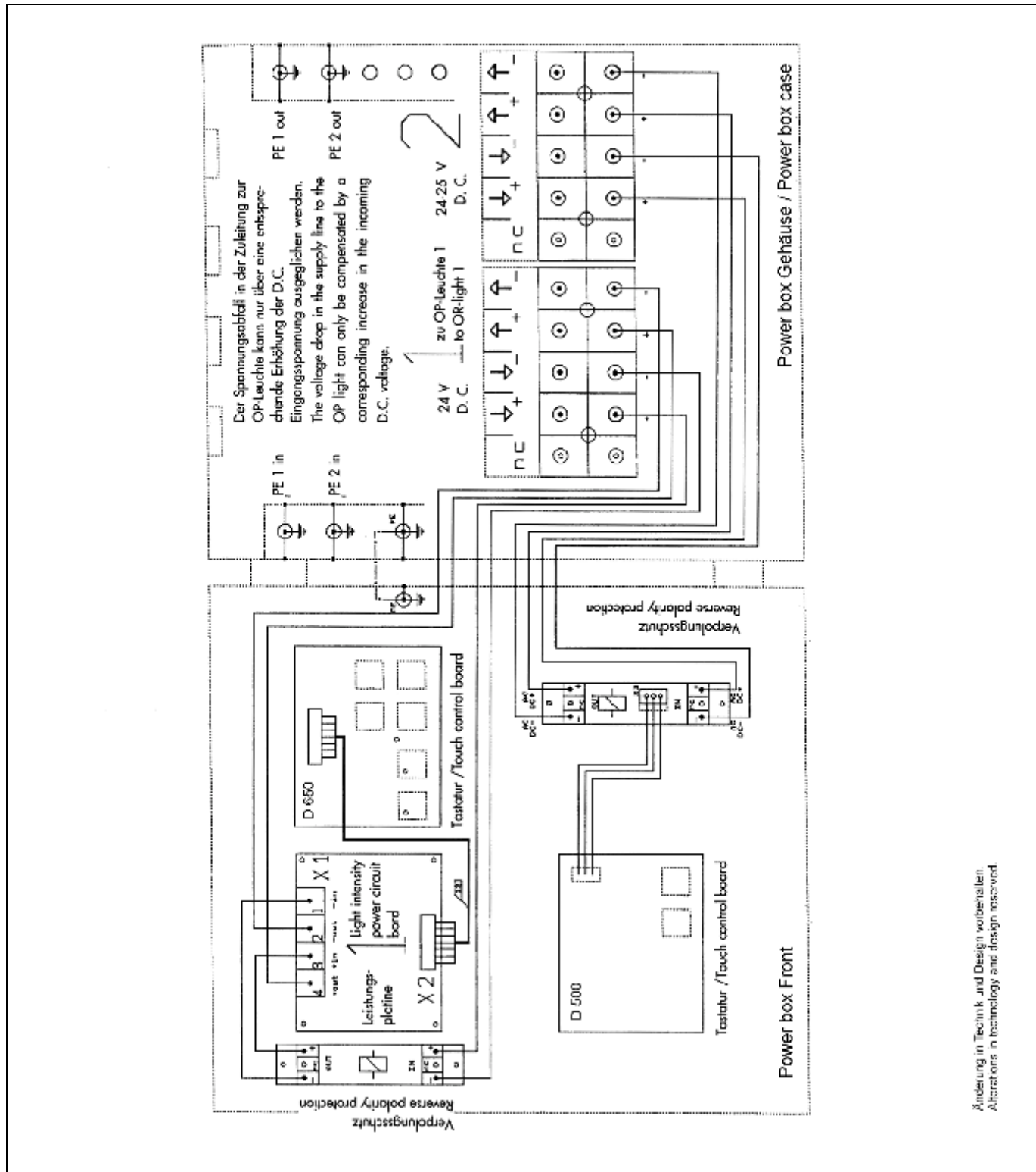
# **14.18 CHROMOPHARE® D 650plus/530plus, D 650/530** Control units in "Power Box" mounted separately from the OR-Light



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# 14.19 CHROMOPHARE® D 650plus/500plus, D 650/500

Control units in "Power Box" mounted separately from the OR-Light



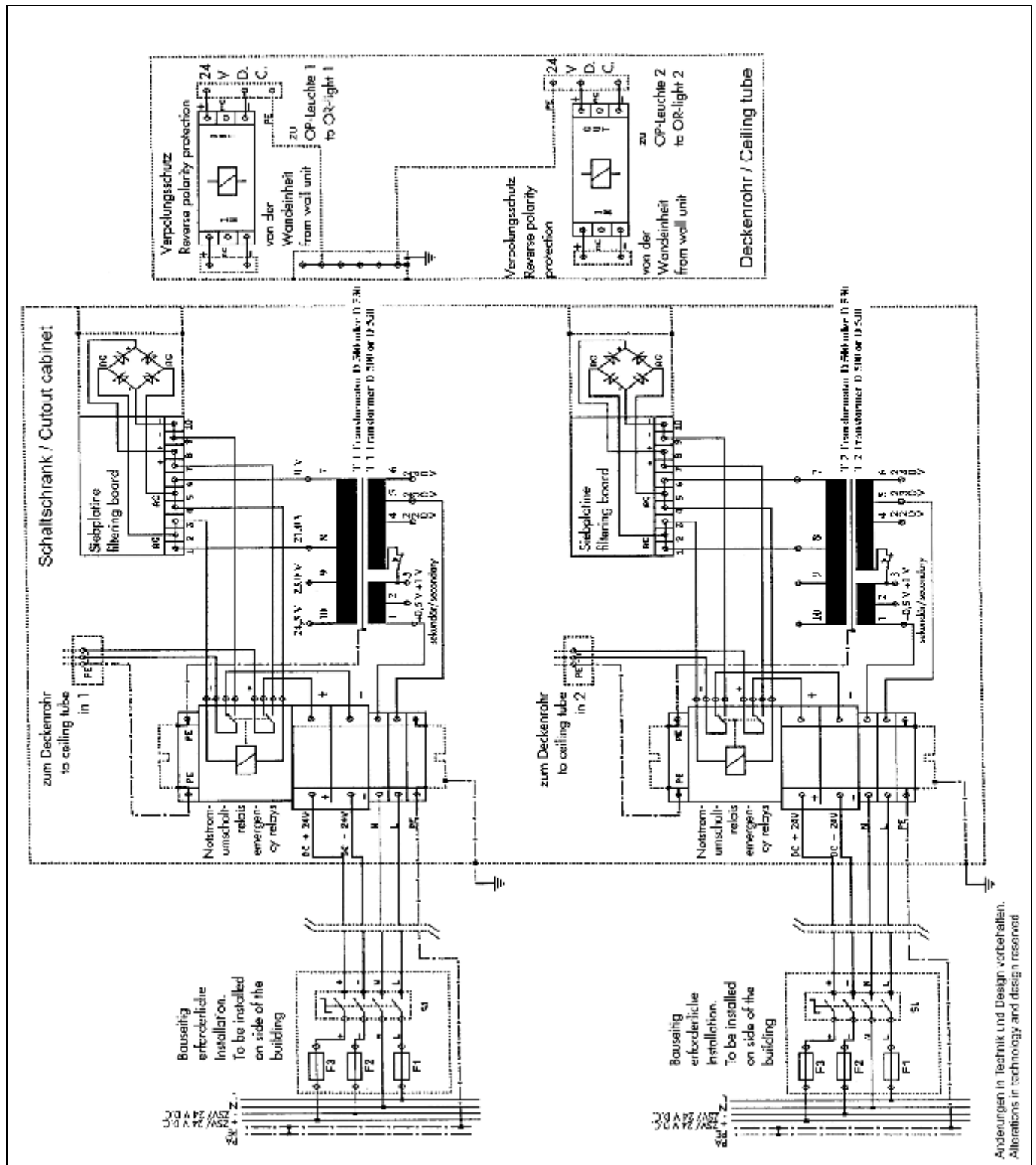
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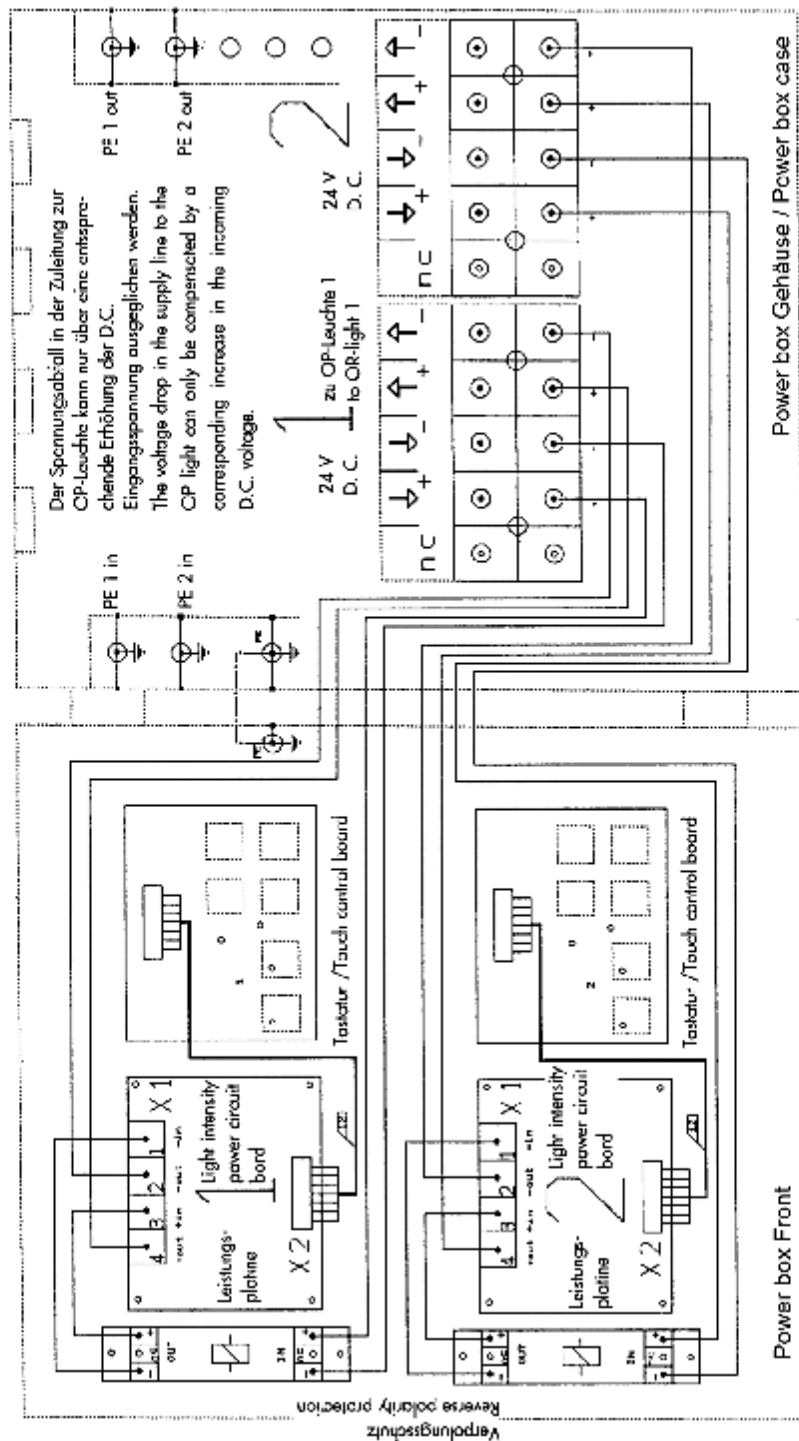
## 14.22 CHROMOPHARE® D 530plus/530plus, D 500plus/500plus, D 530/530, D 500/500

Power supply mounted in a cut-out cabinet



### 14.23 CHROMOPHARE® D 530plus/530plus, D 530/530

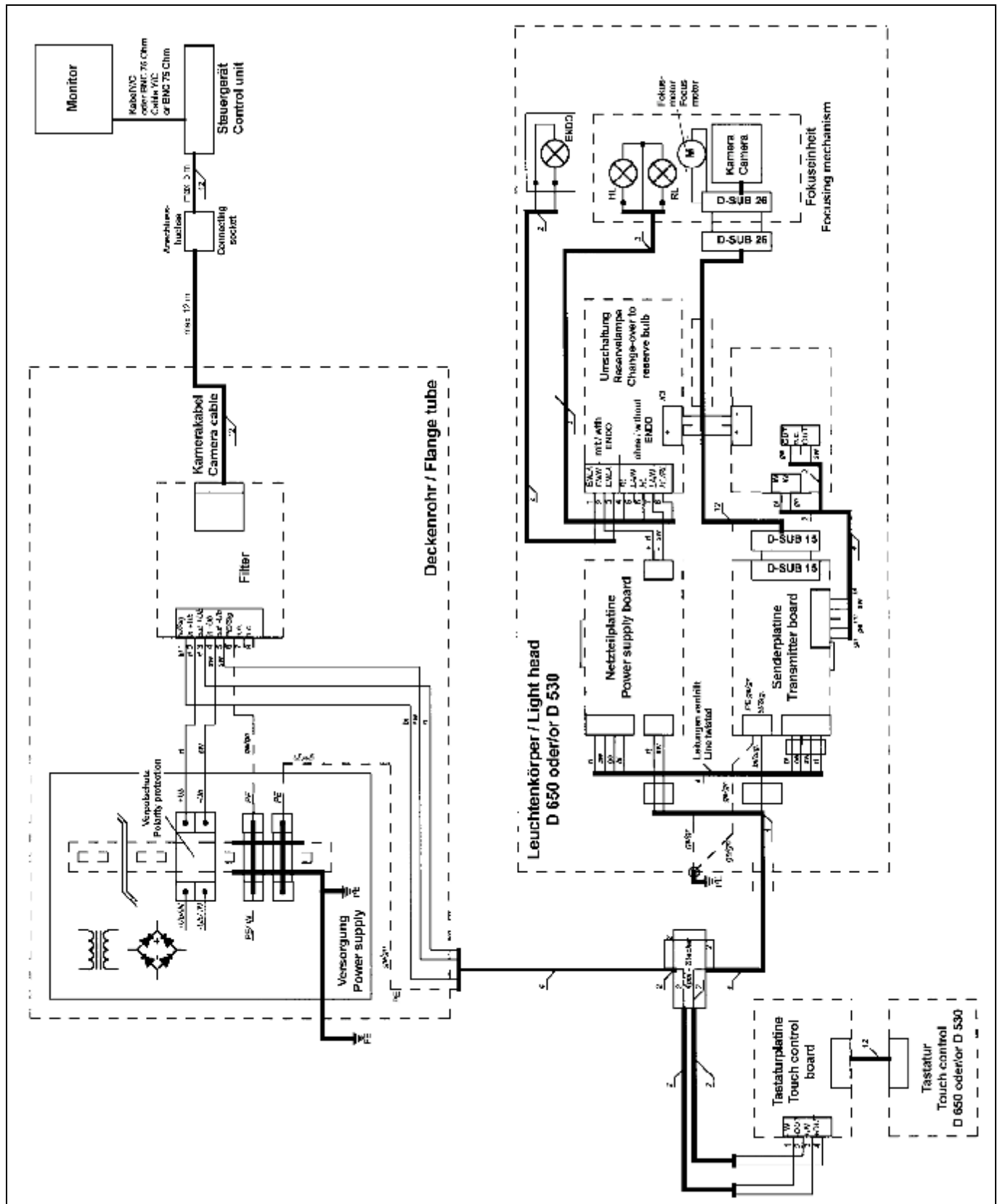
Control units in "Power Box" mounted separately from the OR-Light



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# 14.24 CHROMOPHARE® D 650plus, D 530plus, D 650, D 530

Wiring diagram for OR-lights with BERCHTOLD camera ChromoVision® AF II



## 15. POWER REQUIREMENTS

### 15.1 List of fuse specifications

Fuse values to be installed on-site [A]

	220 – 240 V		110 – 120 V	
Light	L F1 [A]	Battery F2/F3 [A]	L F1 [A]	Battery F2/F3 [A]
D 500plus D 530plus	2	10	4	10
D 650plus	4	16	6,3	16
D 500 D 530	2	10	4	10
D 650	4	16	6,3	16
	All fuse slow blow			

### 15.2 List of terminal voltages

The terminal voltages specified in table below must be provided on the flanged tube of the CHROMOPHARE® light or the Power Box

	Ceiling tube		Power Box	
Light	A.C. [V]	D.C. [V]	A.C. [V]	D.C. [V]
D 500plus D 530plus	21,5 (*)	24 + 1,5/-0,3	21,5 (*)	24 + 1,5/-0,3
D 650plus	21,5 (*)	24 + 1,5/-0,3	21,5 (*)	24 + 1,5/-0,3
D 500 D 530	21,5 (*)	24 + 1,5/-0,3	21,5 (*)	24 + 1,5/-0,3
D 650	21,5 (*)	24 + 1,5/-0,3	21,5 (*)	24 + 1,5/-0,3

(\*) filtering board next in line



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